

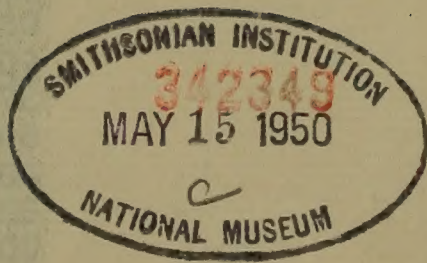
VOLUME VIII.

GRAPHOPHONE PATENTS.

858,763 - 908,411.

July 2, 1907 - December 29, 1908.

Aiken, E. L.	875,309	✓
" "	878,032	✓
Allison, H. H.	874,819	✓
Ames, Burgess & Traynor	888,682	✓
" "	891,196	✓ dupl.
Anderson, G. J.	892,205	✓
Arnold, Oscar	892,494	✓
Aylsworth, J. W.	871,554	✓
" "	880,707	✓
Babson & Haug	863,135	✓
" "	872,783	✓
Baldwin, H.	884,062	✓
Baldwin, Nathaniel	869,288	✓
Beppler, C. A.	881,843	✓
Berens, S.	890,754	✓
Berliner, H. S.	878,931	✓
Blackman, J. N.	865,674	✓
Bornand & Thoens	873,013	✓
Boswell, Robert A.	859,165	✓
Boulanger & Delaye	897,053	✓
Burgess, Ames & Traynor	888,682	✓ dupl.
" "	891,196	✓ dupl.
Capps & Macdonald	865,716	✓ dupl.
" "	870,569	✓ dupl.
Carney & Weaver	867,773	✓ dupl.
Chapman, W. A.	888,306	✓
" "	901,781	✓
" "	901,782	✓
Cheney, G. K.	879,363	✓
Chisholm, C. L.	881,546	✓
" "	881,547	✓
Clay, F. W. H.	881,664	✓
" "	900,706	✓
Cobb, Wm. S.	906,388	✓
Conn, C. G.	903,059	✓
Cook, C. P.	890,338	✓
Cook, W. A.	878,121	✓



Delays & Boulanger	897,053	— dupl.
Dennison, W. N.	880,369	✓
Devineau, Louis	861,206	✓
" "	865,769	✓
" "	905,855	✓
Dirzuweit, J. F.	865,574	✓
Donaldson, Edwin B.	880,016	✓
Douglass, Leon F.	865,088	✓
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Duncan, G. W.	875,790	✓
Dyer & Lewis	904,853	✓
Eckhardt, Walter L.	903,364	✓
Eifel, Joseph	904,187	✓
Elfering, John H.	867,259	✓
Emerson, V. H.	878,513	✓
English, J. C.	877,184	✓
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" "	898,201	✓
Falk, O. F.	893,230	✓
Fischer, A.	879,755	✓
" "	904,523	✓
Fitzpatrick, W.	885,989	✓
Ford, A.	888,986	✓
Fosler, I. G.	878,516	✓
Garrard, C. G.	861,827	✓
Gibbs, S. W.	883,190	✓
Gibson, R. L.	868,771	✓
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" "	896,009	✓
Goldfaden, S.	881,792	✓
Graham, Chas. F.	877,327	✓
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Haile, L. T.	873,937	✓
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Haines, J. H. J.	895,853	✓
Hall, F. D.	870,723	✓
Hardinge, F.	895,456	✓
Hart, Wm.	867,821	✓
Hartmann, Carl	907,794	✓
Haug, Andrew	863,174	✓
Haug & Babson	863,135	— dupl.
" "	872,783	— dupl.
Haug & Royal	903,375	✓

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Henry, A.	902,579	✓
Higham, D.	876,350	✓
Higley, J. M.	877,842	✓
Hirschfelder, J. O.	886,056	✓
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Hoffman, A.	870,961	✓
Holden, Delos	904,959	✓
Holmes, H. F.	873,860	✓
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Hough, J. E.	905,184	✓
Houlehan & Mayo	879,288	—
Hoyt, Wm. H.	867,975	✓
" "	897,254	✓
Hunter, Wm. N.	875,352	✓
Hyatt, E. B.	904,875	✓

Jadwin, C. C.	903,575	✓
Jenkins & O'Neel	905,220	—
Johnson, E. R.	865,105	✓
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Joly, Henry	908,411	✓
Jones, Junius W.	901,910	✓
Junod, A.	894,956	✓
" "	905,082	✓

Kamrath & Rabe	859,180	—
Kandall, A.	902,739	✓
Keating, Bernard F.	885,484	✓
Keen, Morris	907,814	✓
Kerr, J. S.	901,713	✓
Kitsee, I.	871,511	✓
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" "	900,934	✓
" "	903,198	✓
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" "	903,200	✓
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Kooh, Henry	865,398	✓
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Kraemer, Thos.	881,322	✓
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" "	887,657	✓
" "	890,142	✓
" "	891,079	✓
" "	899,874	✓

Landon, J. M.	893,525	✓
Leeds & Rumpf	897,836	✓
Leighton, W. E.	872,828	✓
Levin, Samuel	870,300	✓
" "	890,777	✓
Lewis & Dyer	904,853	✓ - dupl.
Lewis, Frank D.	904,884	✓
Lieb, John A.	907,383	✓
Longfellow, Henry W., Jr.	907,826	✓
Lyke & Wilkes	860,110	✓ - dupl.

Macdonald & Capps	865,716	✓
" "	870,569	✓
Macdonald, T. H.	862,407	✓
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Martelock, Charles	899,880	✓
Marten, Albert S.	885,263	✓
Martin, Wm. H.	905,899	✓
Matthews & Philpot	892,301	✓
Mayo & Houlehan	879,288	✓
McCallie, J. M.	862,501	✓
Mestraud, Arthur C.	880,320	✓
Meyers, C. L.	866,950	✓
Miller, Walter H.	883,327	✓
Mills, Herbert S.	876,006	✓
Mobley, E. H.	863,612	✓
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Moore, A. T.	865,344	✓
Morin, George	871,726	✓
Mosa, S.	889,480	✓
Murphy, F. M.	860,388	✓
Murray, John F.	860,604	✓
Myers, F.	860,878	✓
Mygind, J. T.	887,833	✓

Nies, Harry	899,464	✓
Norcross, I. W.	900,876	✓
Norman, F. B.	872,577	✓

O'Neel & Jenkins	905,220	✓
O'Neill, A. J.	874,983	✓

Patterson, Wm. J.	897,774	✓
Philpot & Matthews	892,301	✓
Pierman, A.N.	867,597	✓
" "	891,367	✓
Pratt, Allison A.	864,686	✓
Prazak, Emil	885,178	✓

Rabe & Kamrath	859,130	✓
Rapke, Victor H.	879,797	✓
Reiners, C. A.	866,219	✓
Revell, Roland	867,836	✓
Rodenberger, W. S.	904,453	✓
Roever, J.	880,100	✓
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" "	883,971	✓
Rosenfield, Wm. W.	859,114	✓
" "	879,599	✓
Rosenthal, Louis	887,429	✓
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Runge, W. C.	860,332	✓

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Schroder, Herman	864,758	✓
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Schubert, Wm.	865,435	✓
Schwan, Julius	898,791	✓
Schwank, Chas. W.	898,792	✓
Schwartz, M.	875,853	✓
Seaman, Henry B.	868,763	✓
Sheble, H.	872,586	✓
Sherwood, W. I.	871,370	✓
Skelly, Thomas V.	874,548	✓
Smith, C. A.	871,000	✓
Smith, R. B.	881,831	✓
" "	906,319	✓
Seistmann, A. G.	873,908	✓
Stinson, J. H.	887,978	✓
" "	896,950	✓
Stocker & Welsh	870,698	✓
Stuckey, John C.	869,749	✓

Taylor, Horace H.	906,469	✓
Terhune, L. L.	896,672	✓
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Thoma & Thoma	873,969	✓
" "	893,283	✓
Traynor, Burgess & Ames	888,682	- dupl.
" "	891,196	✓

Valiquet, L. P.	884,963	✓
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Wangemann, A. T. E.	872,592 ✓
Weaver & Carney	867,773 ✓
Weber, Peter	878,029 ✓
" "	905,033 ✓
Welsh & Stocker	370,698 — dupl.
Wheeler, J. F.	873,643 ✓
Wilkes & Lyke	860,110 ✓
Winne, R. P.	381,644 ✓
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Wooster, W. W.	876,673 ✓

Yerion, S. B.	866,552 ✓
Young, Wm. W.	876,035 ✓
" "	904,110 ✓

Zoebl, T.	872,399 ✓
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UNITED STATES PATENT OFFICE.

HENRY B. SEAMAN, OF NEW BRIGHTON, NEW YORK.

PHONOGRAPH-HORN.

No. 858,763.

Specification of Letters Patent.

Patented July 2, 1907.

Application filed February 17, 1906. Renewed June 3, 1907. Serial No. 377,047.

To all whom it may concern:

Be it known that I, HENRY B. SEAMAN, of New Brighton, Staten Island, in the county of Richmond and State of New York, have invented certain Improvements in Phonograph-Horns, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings designating like parts.

This invention relates to phonograph horns and has for its object the provision of a horn which shall be free from the raucous noises characteristic of such horns as constructed at the present day, it being understood that I contemplate the utilization of my invention in any field to which it may be adapted by the nature of my improvements.

Many efforts have been made to do away with the detrimental quality above mentioned, the most recent attempt to accomplish this being what is known as the "Morning Glory" horn, but I have discovered that the raucous quality proceeds not so much from the shape of the horn as from the uninterrupted reflection of the sounds from the sides of the horn, which in the human throat is prevented by the tonsils, teeth, etc.

Accordingly I have devised baffling means to interrupt the sound waves in their progress from the reproducing device through a phonograph horn, and these means may take, conveniently, the form of a plate or gate of which I prefer to provide several within the horn, arranging them also, preferably, so that they will be adjustable at the will of the operator. By this means I provide a tortuous passage for the sound waves, and am enabled to modify the quality of the tone transmitted by the horn, and also to enable its volume to be controlled by the operator readily.

The various features of my invention will be illustrated and described fully in the accompanying drawings and specification and set forth in the claims.

In the drawings, Figure 1 is a longitudinal sectional view of a phonograph horn, in the construction of which my improvements have been embodied; Fig. 2 is a vertical longitudinal section on the line $x-x$, Fig. 1; Fig. 3 is a front elevation looking from right to left on Fig. 2; and Fig. 4 shows a modified form of baffle member.

In the embodiment of my invention selected for illustration and description as a convenient form to enable ready and complete understanding of my improvements, the part designated by the reference numeral 1 is a phonograph horn which may be, and is illustrated as, of usual form in its general construction, and may be of brass or other metal although un-

der certain conditions I may prefer to construct the same of pasteboard, felt, or other non-metallic material.

In accordance with my invention I provide baffling means 2 which in Fig. 1 take the form of a series of gates mounted on wire spindles 3 which project through bearings 4 in the sides of the horn, the spindles being provided with handles 5 by bending or otherwise. As the spindles pass through holes 6 in the gates, which may be of metal or non-metallic material as found most suitable under given conditions, the spindles may readily be withdrawn and reinstated through holes 7 provided in the sides of the horn to enable adjustment of the relative position of the gates, as it will not always be the case that the gates need be of the exact diameter of the interior of the horn at the region where each gate is placed.

In Fig. 2 I have shown the gates as adjusted at different angles to each other, in their dotted line position, but it will be observed that the gates may be arranged in parallelism and that the degree of their angle to the longitudinal axis of the horn may be varied as desired, and other changes in arrangement and construction may be adopted as found desirable. Preferably the gates will not occupy the entire diameter of the horn but a segment will be cut off as shown in Figs. 1 and 2 so that the sound, even if the gates stand across the horn may find its way out in a tortuous manner, and modified form, in accordance with my invention. One gate as that shown at 8 may, if desired, occupy the entire diameter of the horn when closed, to shut off the sound substantially entirely.

In Fig. 4 a baffle member 9 of modified construction, is shown, having teeth 10, and a screw turn handle 11, the teeth acting as does the human teeth to modify the character of the sound emitted so as to do away with "the horn tone". The gates may all be constructed in this modified form.

Having thus fully illustrated and described my invention, it will be understood that I do not limit myself to the specific construction or material described, nor in general otherwise than as set forth in the claims.

What I claim and desire to secure by Letters Patent is:—

1. The combination with a phonograph trumpet of means to form a tortuous passage within said trumpet for the sound waves, to diminish the normal reflection of said waves from the walls of said trumpet, substantially as described.

2. A horn for phonographs and the like, said horn having a toothed baffle member, substantially as described.

3. A horn for phonographs and the like, said horn hav-

ing a plurality of baffle members arranged at different angles to the longitudinal axis of said horn, to form a tortuous passage for the sound waves, substantially as described.

5 4. A horn for phonographs and the like, said horn having a plurality of internal baffle members, arranged to form a tortuous passage for the sound waves, substantially as described.

10 5. A horn for phonographs and the like, said horn having a plurality of internal baffle members, alternately shaped on opposite sides to form a tortuous sound passage in which the normal reflection of sound waves from the walls of the horn will be diminished, and the quality

of the sound emitted will be improved by blending said sound waves.

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6. As an article of manufacture, a toothed baffle member to be inserted within a horn for phonographs or the like, substantially as described.

Signed at New York in the county of New York and State of New York this fifteenth day of February A. D. 20 1906.

HENRY B. SEAMAN.

Witnesses:

ALEXANDER C. PROUDFIT,

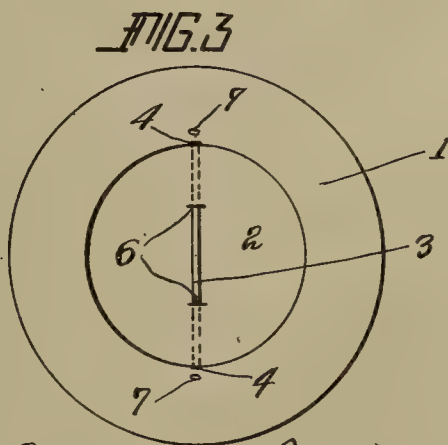
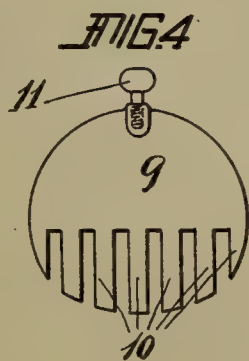
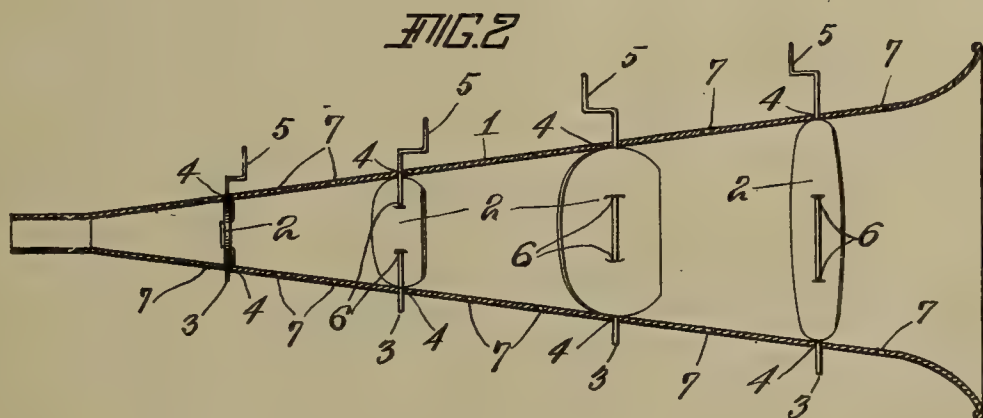
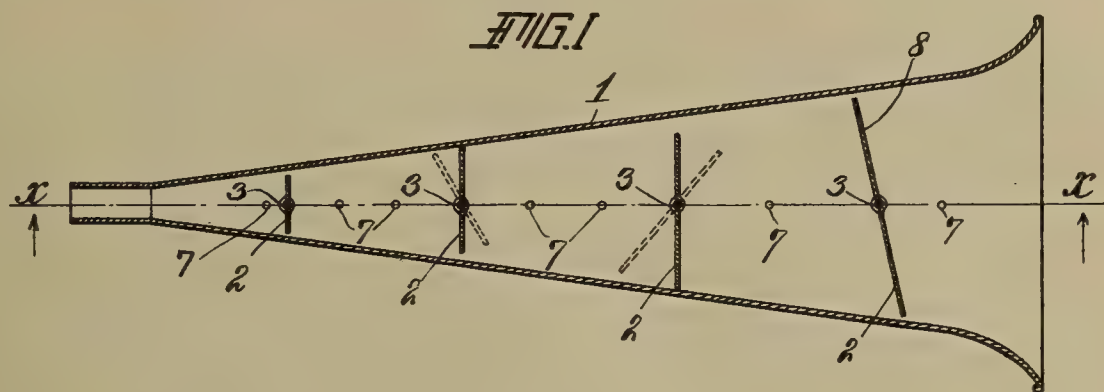
HARRY H. WALTON.

No. 858,763.

PATENTED JULY 2, 1907.

H. B. SEAMAN.
PHONOGRAPH HORN.

APPLICATION FILED FEB. 17, 1906. RENEWED JUNE 3, 1907.



Witnesses
Frank H. Hough
Harry H. Walton

Inventor
Henry B. Seaman
 By *Alexander C. Prouffit*
 His Attorney

UNITED STATES PATENT OFFICE.

WILLIAM W. ROSENFELD, OF NEW YORK, N. Y.

AUTOMATIC PHONOGRAPH.

No. 859,114.

Specification of Letters Patent.

Patented July 2, 1907.

Original application filed August 5, 1904, Serial No. 219,599. Divided and this application filed January 11, 1907.
Serial No. 351,752.

To all whom it may concern:

Be it known that I, WILLIAM W. ROSENFELD, a citizen of the United States, residing at New York city, county of New York, and State of New York, have invented certain new and useful Improvements in Automatic Phonographs, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to automatically operated phonographs, and more particularly to means for raising the reproducer from the record and for returning the parts to normal or starting position.

In accordance with the present invention, the return mechanism of the phonograph is actuated by a motor other than that by which the phonograph is given its reproducing movements, such additional motor being preferably an electric motor. By providing such additional motor for operating the return mechanism, the motor by which the phonograph is given its reproducing movements is relieved of the work of actuating the return mechanism and a much quicker return may be obtained than would otherwise be possible with such motors as are ordinarily used for operating the phonograph.

The invention has been made in connection with and in some of its features is especially adapted for use with phonographs provided with means for automatically re-winding the motor by which the phonograph is given its reproducing movements, and more particularly phonographs of this class in which the phonograph is actuated by a spring motor which is automatically re-wound by an electric motor. When the present invention is applied to such phonograph the automatic return mechanism may be actuated by the electric re-winding motor, the spring motor being thus relieved of the work of actuating the return mechanism. The invention is not, however, to be limited in all its features to a construction in which the return mechanism is actuated by the rewinding motor, since obviously a special motor might be provided for actuating the return mechanism, and when such special motor is provided the invention might be applied to a phonograph not having a re-winding motor as well as to one having a re-winding motor.

A full understanding of the invention can best be given by a detailed description of a preferred construction embodying the various features thereof, and such a description will now be given in connection with the accompanying drawings which show the invention as applied to a spring motor actuated phonograph.

In said drawings, Figure 1 is an elevation. Fig. 2 is a plan of a spring motor actuated phonograph of known construction provided with an automatic return mechanism and with re-winding means constructed in

accordance with the present invention. Fig. 3 is a view of parts of the operating mechanism looking from the back of Figs. 1 and 2. Fig. 4 is a view, partly in section on line $x-x$ of Fig. 3. Fig. 5 is a view, partly in section on line $y-y$ of Fig. 2, looking toward the right. Fig. 6 is a view of parts shown in Fig. 5, but in a different position. Fig. 7 is an enlarged view of parts of the automatic return mechanism, looking toward the left in Figs. 1 and 2. Fig. 8 is a detail view of the friction coupling interposed between the electric motor and the spring motor, the friction spring of such coupling being removed.

Referring first to Figs. 1 and 2, a represents the bed of the phonograph, b is the reproducer arm which is carried by a sleeve b' movable on the guide-bar b^2 and the free end of which reproducer arm rests on the supporting rail a' .

c represents the feed-screw, and c^2 the feed nut carried by the sleeve b' and engaging the under side of the feed screw for causing the reproducing movement of the reproducer arm.

d represents the mandrel, the shaft of which is connected with the shaft of the feed screw c by gears c' . The mandrel and feed screw shafts are mounted in bearings 2, 3 and 4. The mandrel shaft is driven by a belt d' running on a pulley d^2 on said shaft and a pulley e^2 on a shaft of the train of gears e^1 of the spring motor e by which the phonograph is operated in reproducing a record. These parts are of usual and well known construction, and do not require further description.

Secured to the reproducer arm b (see especially Fig. 7) is a bracket arm b^3 which carries an arbor f upon which an eccentric disk g is revoluble. The arbor f also supports an adjustable sleeve f' clamped thereto by the set screw shown in Figs. 2 and 7, the office of which sleeve will be hereinafter described. The eccentric or cam disk g is provided with a notched hub g' , and has secured to its face a weight 6, and its periphery is formed with a notch or low portion 7, with a toothed portion 8 beyond the low portion 7 and extending to a high portion, with a tail rib 9 beyond the toothed portion, and with a portion 10 which is smooth. Pivottally connected to the bracket arm b^3 is a latch h having a tooth 11 for engaging the notch in the hub g' , said latch h being weighted or over-balanced by reason of the position of its pivot h' so that its tooth 11 normally bears against the hub g' . Said arm also has an end 12 on the other side of the pivot from the tooth 11 for engaging a cam rod or arm 13 adjustable longitudinally on a support 14 secured to the bed a of the phonograph. A return feed screw i is mounted in bearings 15 upon the bed of the phonograph. This screw shaft preferably has a spiral groove of coarse pitch compared with the thread of the feed screw c and is provided with teeth be-

tween the convolutions of the groove for a portion of its length. The shaft of the return feed screw carries fast thereon a sprocket i' .

l represents the shaft from an electric motor, having at its upper end a worm l meshing with a gear m' mounted free to rotate upon a horizontally extending shaft m mounted in bearings in the sides of a casing k , said worm gear m' having a spur gear m^2 formed or secured to rotate with it. The shaft m is driven by the rotation of the gear m' , through a slip coupling which will permit the gear to slip on the shaft when a certain resistance is offered to the rotation of the shaft. A suitable form of friction coupling for this purpose is shown. As shown, a collar 18 is mounted fast on the shaft m at one side of the gears m' and m^2 , and at the other side of said gears is a collar 17 also fast on the shaft, while between the collar 17 and the gears is a notched flanged sleeve c^4 held against rotation relatively to the shaft m by a pin c^5 and pressed against the face of the gear m' by a spring 19 one end of which bears against the collar 17 and the other end against the flange of the sleeve c^4 . (Figs. 3 and 8). The shaft m is continued by means of a coupling shown in Figs. 1 and 3, and terminates in a pinion meshing with a gear through which the spring motor e may be rewound.

A shaft n is mounted above the shaft m in bearings 16. Fast on this shaft is a gear m^3 meshing with the gear m^2 ; also fast on this shaft n is a sprocket n' , a chain w passing around the sprocket n' and to and around the sprocket i' on the shaft of the return feed screw for rotating said shaft. The shaft n also has fast thereon a pinion n^2 meshing with a gear o' mounted upon an arbor o which is secured in a lug of the casing k . A cam disk s of conducting material is mounted to rotate with the gear o' and is insulated from the gear o' and the arbor o by being mounted on an insulating disk r secured to the gear o' . A spring contact arm t for engaging the periphery of the cam disk s is secured by a binding-post clamp t' to an insulating post s' fast to a post k^3 rising from the top plate k' of the casing k . A contact spring r^2 which constantly bears against the face of the cam disk s is also secured by a binding-post clamp r' to the insulating-post s' . To the binding-post clamps t' and r' are connected wires 20 and 21 respectively of the circuit to the electric motor, so that in the operation of the machine when the contact arm t engages the cam disk s the circuit will be closed for operating the motor.

The contact arm t is normally held out of contact with the cam disk s by means of a rocker arm v pivoted at 22 to a bracket arm k^2 . One end of this rocker arm is provided with an insulating block v^2 adapted to move beneath the contact arm t when the latter has been raised by the high point of the cam disk s , and the rocker arm is under tension of a spring 23 which tends to swing the rocker arm on its pivot to move the block v^2 toward and beneath the end of the contact arm. The other end of the rocker arm is provided with a foot piece v' which lies in the path of movement of the sleeve f' carried by the arbor f in position to be engaged thereby as the reproducer arm approaches the end of its reproducing movement.

The position of the parts as shown in Figs. 1 and 2 is that assumed by them at the end of the reproducing movement of the phonograph preparatory to the return of the reproducer arm to an initial or original position

either to repeat the record or to reproduce from another record. In these figures the position of the rocker-arm v and the spring contact arm t is as represented in Fig. 5, while the position of these parts during the reproduction of the record and before the arbor f and its sleeve f' reach the limit of their movement is that represented in Fig. 6—that is to say—with the insulating-block v^2 moved beneath and supporting the free end of the spring arm t , in which position the electric circuit is broken and the electric motor not running. As shown in Figs. 1 and 2, the extreme advance movement of the reproducer arm and arbor f have brought the end of the sleeve f' in contact with the foot-piece v' and the rocker-arm v has been thereby swung on its pivot to remove the insulating-block v^2 from beneath the end of the spring arm t , allowing the same to drop into contact with the periphery of the cam disk s so as to complete the electric circuit through the wire 20, binding post clamp t' , arm t , cam disk s , contact spring r^2 , binding post clamp r' and wire 21, thereby starting the electric motor. The insulating block v^2 is then held against the side of the arm t by the action of the spring 23 until the arm t is again raised by the cam disk s to permit the block v^2 to again move beneath the arm t . The electric motor being thus started, the rotation of the shaft l and worm-wheel l' drives the gears m' and m^2 , and the shaft m is frictionally driven through the friction coupling formed by the collar 17 and 18, the sleeve c^4 and the spring 19 thereby winding up the spring motor e . Simultaneously the gear m^2 causes the rotation of the gear m^3 and the shaft n , which through the sprocket n' , the chain w and the sprocket i' drives the return feed screw i , and the shaft n through the pinion n^2 also rotates the gear o' and the cam disk s , these parts being so timed and proportioned that the cam disk is not given a complete rotation until the return feed screw has been given a rotation more than sufficient to effect the raising of the reproducer arm and its complete return movement and lowering again to its operative position.

When the return feed screw i begins to rotate the teeth thereof engage and mesh with the teeth 8 of the eccentric disk g (see Fig. 7) and the disk is thereby rotated to cause successive portions of its toothed cam periphery to engage the return feed screw thereby raising the bracket arm b^3 and reproducer arm b to raise the reproducer from the record and move the feed nut from the feed screw c until the teeth 8 have paid out and the tail rib 9 of this eccentric disk has settled into the groove of the return feed screw i . The tooth 11 of the latch h then drops into the notch of the hub g' and holds the eccentric disk against further turning, and the disk, the arm b^3 and the reproducer arm b are then by the continued rotation of the return feed screw given a return movement until the end 12 of the latch h runs under the bent end of the arm 13 whereby the end 12 of the latch is pressed down and the tooth 11 withdrawn from the notch in the hub g' . The eccentric disk g is thereby released and resting on the return feed screw it is turned thereby to bring successive portions of the portion 10 of its cam periphery in engagement with the shaft, whereby the bracket arm b^3 and the reproducer arm are gradually lowered until the reproducer is returned to operative position and the feed nut is again in engagement with the feed screw c . The turning of

the disk *g* will continue until its periphery clears the return feed screw, after which, during any further rotation of the return feed screw and during the next reproducing movement of the reproducer arm, the disk will
 5 be held by the weight 6 in position with its low portion 7 opposite the return feed screw and with the shoulder formed by the first of its teeth 8 bearing against the return feed screw ready to be engaged by the teeth of the return feed screw when the latter is rotated for the
 10 next return movement. The rotation of the return feed screw continues until the end of the contact arm *t* is raised by the cam disk *s* to permit the block *v*² of the rocker arm *v* to move under the end of the contact arm and until the high point of the cam disk has then moved
 15 beyond and out of contact with the contact arm, thereby breaking the circuit and stopping the electric motor.

To insure the full return movement of the reproducer arm, the amount of rotation given to the return feed screw is preferably, and as before pointed out,
 20 more than sufficient to effect the elevation, return and lowering of the reproducer arm with the longest record which the machine is adapted to reproduce. The return feed screw will thus continue to rotate after the reproducer arm has been returned and lowered; and to prevent the eccentric disk *g*, which then rests with the
 25 first of its teeth 8 bearing against the return feed screw, from being turned by such further rotation of the return feed screw, the portion of the return feed screw against which the disk *g* then rests is circumferentially smooth,
 30 the gear teeth of the return feed screw extending only for a part of the length of the screw from the other end thereof.

If the spring motor *e* is allowed to continue in operation after the return of the reproducer arm and the
 35 feed nut to operative position, the phonograph will be again actuated thereby for again reproducing the record, the electric motor meanwhile remaining at rest until the reproducer arm nears the end of its reproducing movement, at which time the sleeve *f*' will again
 40 engage the foot piece *v*' to swing the rocker arm *v* to carry the block *v*² from under the contact arm *t* and permit the contact arm to spring into contact with the periphery of the cam disk *s*, thereby again closing the circuit for causing the electric motor to operate to re-
 45 wind the spring motor and to rotate the return feed screw for again returning the reproducer arm to its initial or starting position. Evidently, however, suitable means may be provided for stopping the operation of the spring motor before the return movement
 50 of the reproducer arm has been completed, and when such means is provided the entire mechanism will remain at rest after the return movement of the reproducer arm has been completed and until the spring motor is again put in operation, whereupon the reproducing and return movements of the phonograph and
 55 the rewinding of the spring motor will again be effected in order and repeated until the spring motor is again stopped.

By adjustment of the sleeve *f*' and the cam rod 13, the mechanism may be adapted for records of varying
 60 length so that the reproducing devices shall operate only over the length of the actual record, thus avoiding waste of time and unnecessary movement of the parts.

65 To insure full rewinding of the spring motor with

the longest record which the machine is adapted to reproduce, the amount of rotation given to the worm gear *m*' at each operation of the electric motor will preferably be more than sufficient to rewind the spring
 70 motor to the tension to which it was wound before the commencement of the reproducing movement, and the friction coupling between the worm gear and the rewinding shaft *m* is provided for the purpose of permitting continued movement of the worm gear after the spring motor has been fully rewound, the resist-
 75 ance to the rotation of the shaft *m* being sufficient to cause the parts of the coupling to slip.

It will be seen that with the construction shown, the return movement of the reciprocating part of the phonograph, that is the reproducer arm in the construction shown, is effected entirely by the power of the electric motor and does not add at all to the work to be performed by and cannot effect the operation of the spring motor.

It will be understood that the invention is not to be
 85 limited to the exact construction and arrangement of parts shown in the drawings and to which the foregoing description has been mainly confined, but that it includes changes and modifications thereof within the claims. It will be understood also that features of the
 90 invention may be employed independently of other features thereof, and that the invention or features thereof may be applied to other forms of phonographs from that shown. It will be understood also that the term "phonograph" is used herein as a broad term to
 95 include all sound reproducing machines to which the invention is or may be found applicable.

Features of invention contained in the construction shown and not claimed herein are claimed in my original application No. 219,599, filed August 5, 1904, of
 100 which this application is a division.

I claim as my invention.

1. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of means for automatically storing power in said motor, and automatic return mechanism actuated by said means, substantially as described. 105

2. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of a second motor for storing power in the first motor, and automatic return mechanism actuated by the second motor for returning the reciprocating member of the phonograph to normal position, substantially as described. 110

3. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of a second motor, automatically operated means for causing power to be stored in the first motor by the operation of the second motor after the reproduction of a record, and automatic return mechanism actuated by the second motor for returning the reciprocating member of the phonograph to normal position, substantially as described. 115 120

4. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of a second motor, automatically operated means for causing power to be stored in the first motor by the operation of the second motor after the reproduction of a record, and means actuated by the second motor for causing a relative separating movement between the reproducer of the phonograph and the record for the return of the reciprocating member of the phonograph to normal position, substantially as described. 125 130

5. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of a second motor, a normally non-rotating return feed screw, means co-operating with the return feed screw for returning the reciprocating member of the phonograph to nor- 135

- mal position, connections between the first motor and the return feed screw and the second motor for causing the return feed screw to be rotated and power to be stored in the first motor by the operation of the second motor, and means controlled by the movement of the reciprocating member of the phonograph for causing the second motor to operate after the reproduction of a record, substantially as described.
6. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of an electric motor, connections for storing power in the first motor by the operation of the electric motor, automatic return mechanism operated by the electric motor for returning the reciprocating member of the phonograph to normal position, and means controlled by the movement of the reciprocating member of the phonograph for closing the circuit to the electric motor after the reproduction of a record, substantially as described.
7. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of an electric motor, a return feed screw, means co-operating with the return feed screw for returning the reciprocating member of the phonograph to normal position, and connections between the first motor and the return feed screw and the electric motor for causing the return feed screw to be rotated and power to be stored in the first motor by the operating of the electric motor, substantially as described.
8. The combination with a phonograph and a spring motor for actuating the phonograph in reproducing a record, of a second motor and connections for rewinding the spring motor, and automatic return mechanism actuated by the second motor for returning the reciprocating member of the phonograph to normal position, substantially as described.
9. The combination with a phonograph and a spring motor for actuating the phonograph in reproducing a record, of a second motor and connections for rewinding the spring motor, and means actuated by the second motor for causing a relative separating movement between the reproducer of the phonograph and the record for the return of the reciprocating member of the phonograph to normal position, substantially as described.
10. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of a second motor, and automatic return mechanism actuated by the second motor for returning the reciprocating member of the phonograph to normal position, substantially as described.
11. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of a second motor, means actuated by the second motor for causing a relative separating movement between the reproducer of the phonograph and the record for the return of the reciprocating member of the phonograph to normal position, and means controlled by the movement of a part actuated by the first said motor for causing said means for separating the reproducer and the record to be actuated by the second motor, substantially as described.
12. The combination with a phonograph having a reciprocating reproducer carrier and with a motor for actuating the phonograph in reproducing a record, of a second motor, and means actuated by the second motor for automatically raising the reproducer and returning the reproducer carrier to normal position, substantially as described.
13. The combination with a phonograph having a reciprocating reproducer carrier and with a motor for actuating the phonograph in reproducing a record, of an electric motor, and means actuated by the electric motor for raising the reproducer and returning the reproducer carrier to normal position, substantially as described.
14. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of electrically operated means independent of said motor for returning the reciprocating member of said phonograph to normal position, and means controlled by the movement of a part actuated by the first said motor for closing the circuit for the operation of said electrically operated means, substantially as described.
15. The combination with a phonograph having a reciprocating reproducer carrier and with a motor for actuating the phonograph in reproducing a record, of a second motor, automatically operated means for causing power to be stored in the first motor by the operation of the second motor, and means actuated by the second motor for raising the reproducer and returning the reproducer carrier to normal position, substantially as described.
16. The combination with a phonograph having a reciprocating reproducer carrier and with a motor for actuating the phonograph in reproducing a record, of a second motor, a return feed screw, means for co-operating with the return feed screw for raising the reproducer and for returning the reproducer carrier to normal position, and connections between the first motor and the return feed screw and the second motor for causing the return feed screw to be rotated and power to be stored in the first motor by the operation of the second motor, substantially as described.
17. The combination with a phonograph having a reciprocating reproducer carrier and with a motor for actuating the phonograph in reproducing a record, of a second motor, a normally non-rotating return feed screw, a cam disk mounted to move with the reproducer carrier in position to co-operate with the return feed screw, and connections between the first motor and the return feed screw and the second motor for causing the return feed screw to be rotated and power to be stored in the first motor by the operation of the second motor, the rotation of the return feed screw causing first a turning of the cam disk to cause successive portions of its cam periphery to successively engage the return feed screw to raise the reproducer and then a movement of the cam disk longitudinally of the return feed screw to impart a return movement to the reproducer carrier, substantially as described.
18. The combination with a phonograph having a reciprocating reproducer carrier and with a motor for actuating the phonograph in reproducing a record, of a second motor, a normally non-rotating return feed screw having gear teeth at and near one end, a cam disk mounted to move with the reproducer carrier in position to co-act with the return feed screw and to turn at substantially right angles to the line of the return feed screw, said disk having a portion of its periphery of progressively increasing radius provided with gear teeth to co-act with the teeth of the return feed screw and having a portion beyond the toothed portion to co-act with the thread of the return feed screw, connections between the first motor and the return feed screw and the second motor for causing the return feed screw to be rotated and power to be stored in the first motor by the operation of the second motor, and means controlled by the movement of the reproducer carrier for causing the second motor to operate after the reproduction of a record, substantially as described.
19. The combination with a phonograph having a reciprocating reproducer carrier and with a motor for actuating the phonograph in reproducing a record, of a normally non-rotating return feed screw having gear teeth at and near one end thereof, a second motor for driving the return feed screw, a device for co-operating with the return feed screw for returning the reproducer carrier to normal position, said device having a part to co-act with the gear teeth of the return feed screw for raising the reproducer and being mounted to move with the reproducer carrier in position to co-act with the gear teeth of the return feed screw when the latter is rotated, and automatically operated means for causing the return feed screw to be rotated by the second motor during the interval between successive reproductions of a record or records, substantially as described.
20. The combination with a phonograph having a reciprocating reproducer carrier, of a return feed screw having gear teeth at and near one end thereof and having its surface at and near the other end circumferentially smooth, a device for co-operating with the return feed screw for returning the reproducer carrier to normal position, said device having a part to co-act with the gear teeth of the return feed screw for raising the reproducer and being mounted to move with the reproducer carrier in position to co-act with the gear teeth of the return feed screw when

the latter is rotated, and means for causing the return feed screw to rotate for the return movement of the reproducer carrier and to remain stationary during the latter part of the reproducing movement of the reproducer carrier, substantially as described.

21. The combination with a phonograph having a reciprocating reproducer carrier, of a return feed screw having gear teeth at and near one end thereof and having its surface at and near the other end circumferentially smooth, a cam disk mounted to move with the reproducer carrier and in position to co-act with the return feed screw and mounted to turn at substantially right angles to the line of the return feed screw, said disk having a portion of its periphery of progressively increasing radius provided with gear teeth to co-act with the gear teeth of the return feed screw and having a portion beyond the toothed portion formed to co-act with the thread of the return feed screw and having a portion of progressively decreasing radius extending from said thread co-acting portion and having the first tooth of its toothed portion extending radially beyond the adjacent low portion of its periphery, and means for rotating the return feed screw for the return movement of the reproducer carrier and for holding the same stationary during the reproduction of a record, substantially as described.

22. The combination with a phonograph having a reciprocating reproducer carrier and with a motor for actuating the phonograph in reproducing a record, of an electric motor, means actuated by the electric motor for raising the reproducer and returning the reproducer carrier to normal position, means controlled by the movement of the reproducer carrier for closing the circuit to the electric motor when the reproducer carrier has reached a certain point in its reproducing movement, and adjustable means for determining the point in the reproducing movement of the reproducer carrier at which the circuit to the electric motor shall be closed, substantially as described.

23. The combination with a phonograph having a reciprocating reproducer carrier and with a motor for actuating the phonograph in reproducing a record, of an electric motor, connections for storing power in the first motor by the operation of the electric motor, means actuated by the electric motor for raising the reproducer and returning the reproducer carrier to normal position, means controlled by the movement of the reproducer carrier for closing the circuit to the electric motor when the reproducer carrier has reached a certain point in its reproducing movement, and adjustable means for determining the point in the reproducing movement of the reproducer carrier at which the circuit to the electric motor shall be closed, substantially as described.

24. The combination with a phonograph having a reciprocating reproducer carrier and with a motor for actuating the phonograph in reproducing a record, of an electric motor, connections for storing power in the first motor by the operation of the electric motor, return mechanism operated by the electric motor for returning the reproducer carrier to normal position, means controlled by the movement of the reproducer carrier for closing the circuit to the electric motor when the reproducer carrier has reached a certain point in its reproducing movement, and adjustable means for determining the point in the reproducing movement of the reproducer carrier at which the circuit to the electric motor shall be closed, substantially as described.

25. The combination with a phonograph and with a motor for actuating the phonograph in reproducing a record, of an electric motor, connections for storing power in the first motor by the operation of the electric motor, return mechanism actuated by the electric motor for returning the reciprocating member of the phonograph to normal position, means controlled by the movement of a part actuated by the first motor for closing the circuit to the electric motor, and adjustable means for determining the time of closing of the circuit to the electric motor with relation to the operation of the phonograph, substantially as described.

26. The combination with a phonograph, and with a motor for actuating the phonograph in reproducing a record, of a second motor for storing power in the first motor, return mechanism actuated by the second motor for return-

ing the reciprocating member of the phonograph to normal position, means for causing the second motor to operate after a certain operation of the phonograph, and adjustable means for varying the time at which the second motor is caused to operate with relation to the operation of the phonograph, substantially as described.

27. The combination with a phonograph having a reciprocating reproducer carrier, of a normally non-rotating return feed screw, a device mounted to move with the reproducer carrier for co-operating with the return feed screw for raising the reproducer and for returning the reproducer carrier to normal position, means controlled by the movement of the reproducer carrier for causing the return feed screw to rotate after the reproduction of a record for operating said device to raise the reproducer and return the reproducer carrier to normal position, adjustable means for determining the point in the reproducing movement of the reproducer carrier at which said device is operated by the return feed screw to raise the reproducer and means for causing the reproducer to be lowered again to operative position at the end of the return movement of the reproducer carrier, said last mentioned means being adjustable for determining the point in the return movement of the reproducer carrier at which the reproducer shall be lowered to operative position, substantially as described.

28. The combination with a phonograph having a reciprocating reproducer carrier, of a normally non-rotating return feed screw, a device mounted to move with the reproducer carrier for co-operating with the return feed screw for raising the reproducer and for returning the reproducer carrier to normal position, means controlled by the movement of the reproducer carrier for causing the return feed screw to rotate after the reproduction of a record for operating said device to raise the reproducer and return the reproducer carrier to normal position, and means for causing the reproducer to be lowered again to operative position at the end of the return movement of the reproducer carrier, said last mentioned means being adjustable for determining the point in the return movement of the reproducer carrier at which the reproducer shall be lowered to operative position, substantially as described.

29. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of an electric motor, return mechanism actuated by the electric motor for returning the reciprocating member of the phonograph to normal position, means controlled by the movement of a part of the phonograph for closing the circuit to the electric motor, and means controlled by the electric motor for opening said circuit, substantially as described.

30. The combination with a phonograph having a reciprocating reproducer carrier, of a normally non-rotating return feed screw, means for co-operating with the return feed screw for raising the reproducer and for returning the reproducer carrier to normal position, and means for causing the return feed screw to rotate for the return movement of the reproducer carrier during the interval between successive reproductions of a record or records, substantially as described.

31. The combination with a phonograph having a reciprocating reproducer carrier, of a normally non-rotating return feed screw, means for co-operating with the return feed screw for raising the reproducer and for returning the reproducer carrier to normal position, and means controlled by the movement of the reproducer carrier for causing the return feed screw to rotate for the return movement of the reproducer carrier after the reproduction of a record, substantially as described.

32. The combination with a phonograph having a reciprocating reproducer carrier, of an intermittently rotating return feed screw, and means for co-operating with the return feed screw for raising the reproducer and for returning the reproducer carrier to normal position, substantially as described.

33. The combination with a phonograph, of a normally non-rotating return feed screw, means for co-operating with the return feed screw for returning the reciprocating member of the phonograph to normal position, and means for causing the return feed screw to rotate for the return movement of the reciprocating member of the phonograph, substantially as described.

34. The combination with a phonograph having a reciprocating reproducer carrier, of a return feed screw having gear teeth at and near one end thereof, a device mounted to move with the reproducer carrier and movable at substantially right angles to the line of the return feed screw and having a thread engaging part for engaging the thread of the return feed screw to impart a return movement to the reproducer carrier and to support the reproducer carrier during its return movement, and having a part to co-act with the gear teeth of the return feed screw for moving said device in the direction at substantially right angles to the line of the return feed screw to raise the reproducer carrier and to bring the thread engaging part of said device into engagement with the thread of the return feed screw, said device being supported during the latter part of the reproducing movement of the reproducer carrier in position to have its gear engaging portion engaged by the gear teeth of the return feed screw when the latter is rotated, and means for causing the return feed screw to rotate for the return movement of the reproducer carrier and to remain stationary during the latter part of the reproducing movement of the reproducer carrier, substantially as described.

35. The combination with a phonograph having a reciprocating reproducer carrier, of a return feed screw having gear teeth at and near one end thereof and having its surface at and near the other end circumferentially smooth, a device mounted to move with the reproducer carrier and movable at substantially right angles to the line of the return feed screw and having a thread engaging part for engaging the thread of the return feed screw to impart a return movement to the reproducer carrier and to support the reproducer carrier during its return movement, and having a part to co-act with the gear teeth of the return feed screw for moving said device in the direction at substantially right angles to the line of the return feed screw to raise the reproducer carrier and to bring the thread engaging part of said device into engagement with the thread of the return feed screw, said device being supported during the reproducing movement of the reproducer carrier with its gear engaging portion resting against the return feed screw, and means for causing the return feed screw to rotate for the return movement of the reproducer carrier and to remain stationary during the latter part of the reproducing movement of the reproducer carrier, substantially as described.

36. The combination with a phonograph having a recip-

rocating reproducer carrier, of a return feed screw, a device mounted to move with the reproducer carrier and having a part for engaging the return feed screw to impart a return movement to the reproducer carrier and to support the reproducer carrier during its return movement, means rotating with the return feed screw and extending longitudinally thereof at and near one end thereof for engaging said device to raise the reproducer carrier and to move said device to bring its thread engaging part into engagement with the thread of the return feed screw, said device being supported during the latter part of the reproducing movement of the reproducer carrier in position to be engaged by said means rotating with the return feed screw, and means for causing the return feed screw to rotate for the return movement of the reproducer carrier and to remain stationary during the latter part of the reproducing movement of the reproducer carrier, substantially as described.

37. The combination with a phonograph having a reciprocating reproducer carrier, of a return feed screw, a part mounted to move with the reproducer carrier for co-operating with the return feed screw for returning the reproducer carrier to normal position, means rotating with the return feed screw to cause the reproducer to be raised and to cause said part to move into operative engagement with the return feed screw, and means for causing the return feed screw to rotate for the return movement of the reproducer carrier and to remain stationary during the latter part of the reproducing movement of the reproducer carrier, substantially as described.

38. The combination with a phonograph having a reciprocating reproducer carrier, of normally non-rotating rotary means mounted with its axis substantially parallel with the direction of movement of the reproducer carrier, a lifting device for co-acting with said rotary means mounted to move with the reproducer carrier and supported in position to be engaged by said rotary means as the reproducer reaches the end of its reproducing movement, and means for causing said rotary means to rotate to co-act with said lifting device to raise the reproducer for its return movement, substantially as described.

In testimony whereof, I have hereunto set my hand, in the presence of two subscribing witnesses.

WILLIAM W. ROSENFELD.

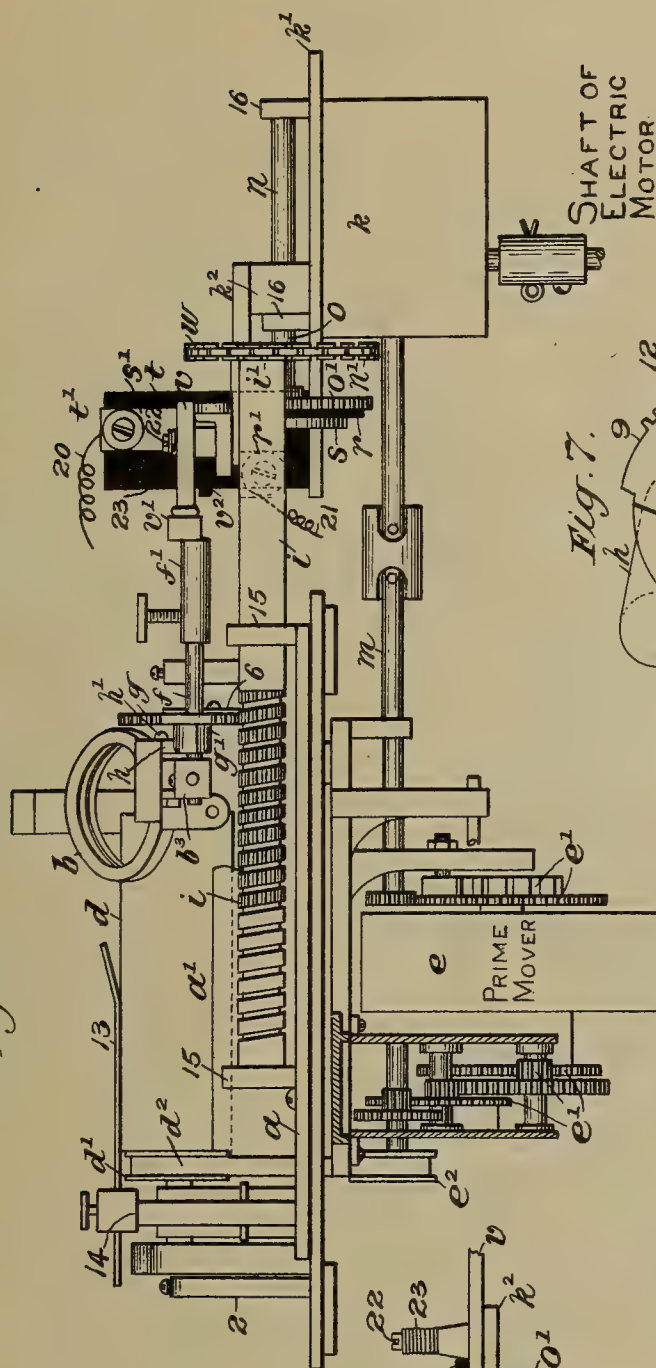
Witnesses:

A. WHITE,
A. L. KENT.

W. W. ROSENFELD.
AUTOMATIC PHONOGRAPH.
APPLICATION FILED JAN. 11, 1907.

2 SHEETS—SHEET 1.

Fig. 1.



SHAFT OF
ELECTRIC
MOTOR

Fig. 7.

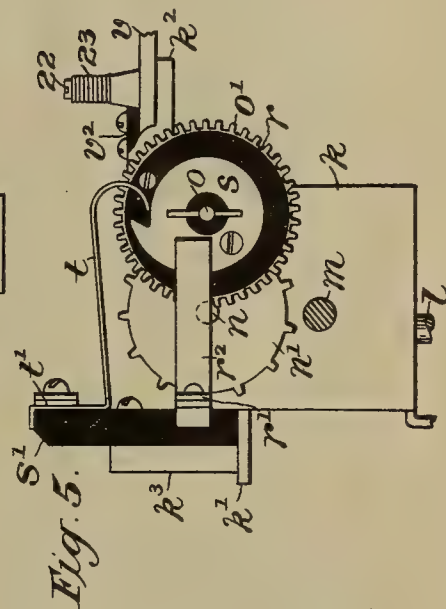
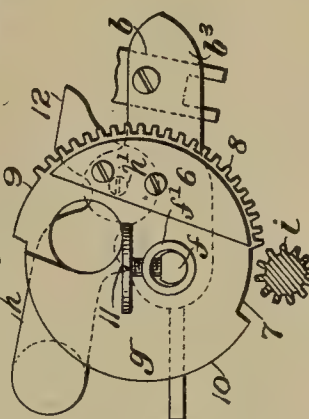
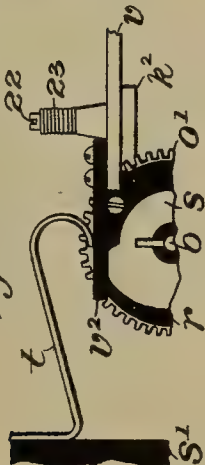


Fig. 5.

Fig. 6.



Witnesses:

A. Kehoe
A. Journey

Inventor:

William W. Rosenfeld

By his Attys:

Philip S. Langer, Rees & Kennedy

W. W. ROSENFELD.
AUTOMATIC PHONOGRAPH.

APPLICATION FILED JAN. 11, 1907.

2 SHEETS—SHEET 2.

Fig. 2.

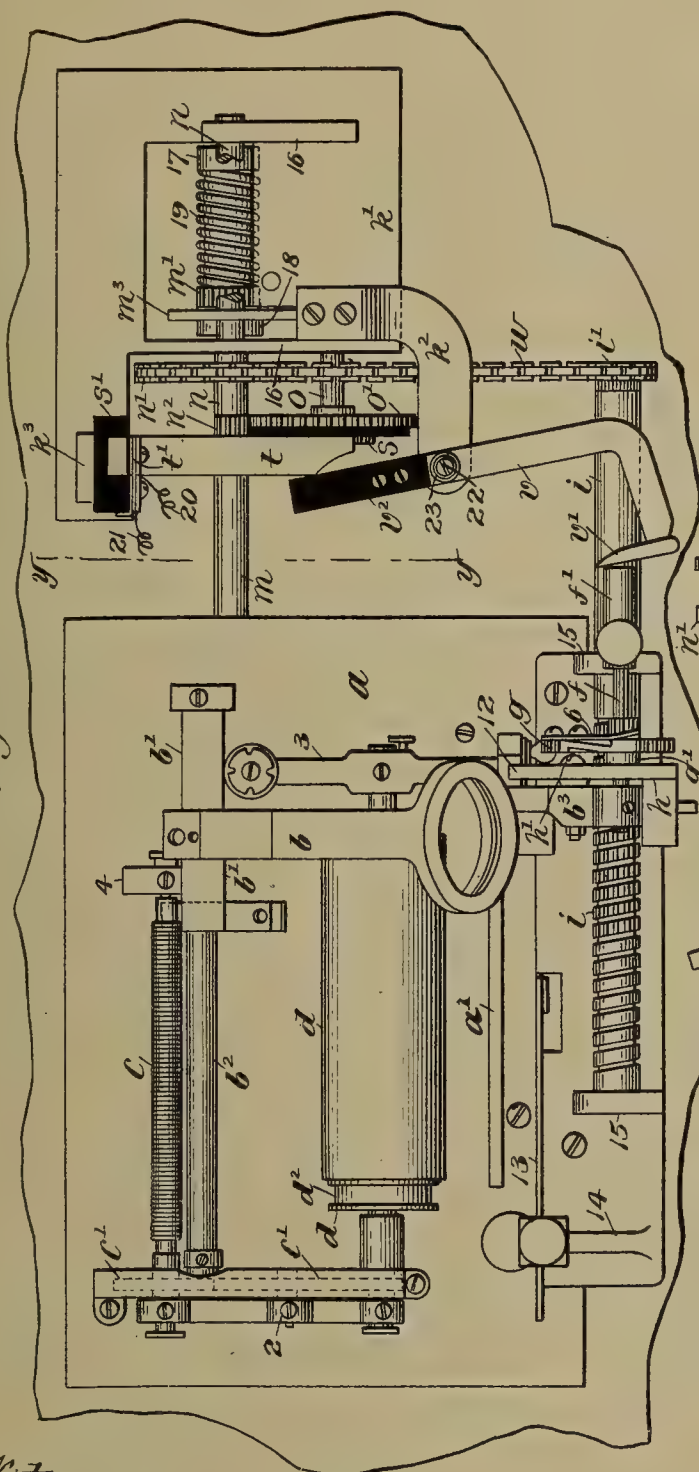


Fig. 3.

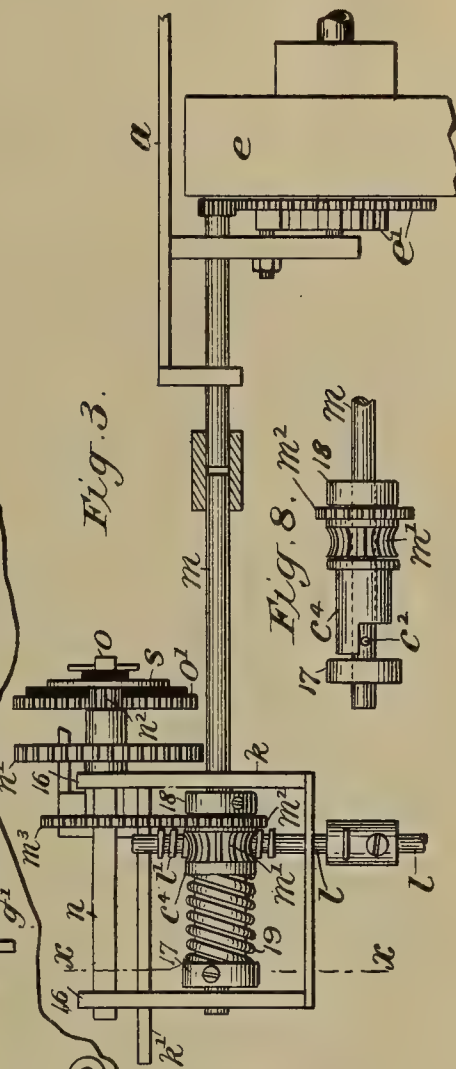
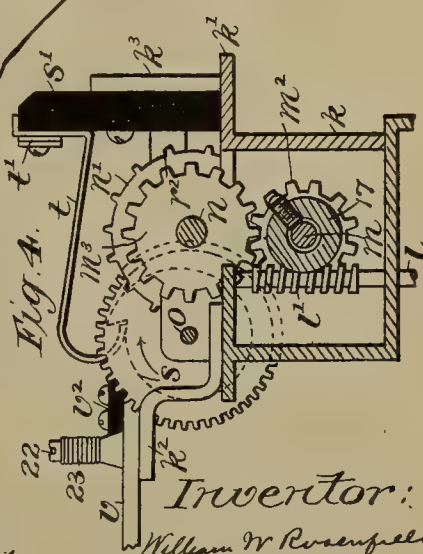


Fig. 8.



Witnesses:
D. McKee
A. J. J. J. J.

Inventor:
William W. Rosenfeld
By his Attys:
Philip S. Sawyer, R. B. Kennedy

UNITED STATES PATENT OFFICE.

ROBERT A. BOSWELL, OF WASHINGTON, DISTRICT OF COLUMBIA.

SOUND-CONVEYING TUBE FOR TALKING-MACHINES.

No. 859,165.

Specification of Letters Patent.

Patented July 2, 1907.

Application filed October 7, 1905. Serial No. 281,765.

To all whom it may concern:

Be it known that ROBERT A. BOSWELL, a citizen of the United States, residing at Washington, in the District of Columbia, have invented a certain new and useful Sound-Conveying Tube for Talking-Machines, of which the following is a description, reference being had to the accompanying drawing and to the figures of reference marked thereon.

This invention relates to sound conveying tubes for talking machines, particularly talking machines of the disk type, and has for its object to provide a simple, inexpensive and efficient construction of the joint or connection between the reproducer arm and the delivery or amplifying horn of such sound conveying tubes, by which the necessary movements of both the reproducer arm and the horn, both horizontal and vertical, may all be effected from substantially the same point or center.

A further object of the invention is to provide a construction of joint or connection between the reproducer arm and the horn by which these parts may have freedom of movement independent of each other, so that whatever may be the position of the horn the free end of the reproducer arm may move freely as may be required to permit the stylus to follow the record groove.

A further object of the invention is to provide means by which the horn may be held in any position in which it may be placed so as to direct the sound in any desired direction and to provide means by which the free end of the reproducer arm may be held in raised position when it is desired to lift it from the record to permit the record to be removed and a new one placed in position.

A further object of the invention is to provide means by which the free end of the reproducer arm will be prevented from sagging if swung to one side off the record.

With the above described objects in view as well as others hereinafter set forth, the invention consists in the construction and combination of elements hereinafter described and pointed out in the claims.

Referring to the drawings: Figure 1 is a perspective view of a talking machine having the invention applied thereto; Fig. 2 is a vertical sectional view through the joint between the reproducer arm and the horn; Fig. 3 is a view similar to Fig. 2 but showing a slightly modified form of joint; Fig. 4 is a view similar to Fig. 2 but showing a further modification; Fig. 5 is a view similar to Fig. 2 showing a further modification; Fig. 6 is a detail sectional view of the construction shown in Fig. 5, but showing the parts in position to be assembled; Fig. 7 is a view similar to Fig. 2, showing a construction similar to that shown in Figs. 5 and 6, but with slight modifications; Fig. 8 is a detail perspective view of the joint end of the horn shown in Fig. 7; Fig. 9 is a detail perspective view of joint end of the reproducer arm shown in Figs. 5, 6 and 7; and Fig. 10 is a horizontal sectional view on line $x-x$ of Fig. 5.

In the drawings, 1 is the casing of a talking machine containing the usual mechanism for rotating the table carrying the record disk.

2 is a bracket secured to one side of the casing for supporting the reproducer arm and horn.

3 is the reproducer arm carrying at its free end the usual sound box 3¹, and having at its other end the upward curve or elbow 4.

5 is the horn which is of usual form having at the end opposite its mouth the downward curve or elbow as shown.

The bracket 2 is provided at its upper end with a ring 25, which in the several forms of the invention hereinafter described serves to support, through intermediate means, both the reproducer arm and the horn. This ring may be integral with the bracket as shown in Figs. 2, 3 and 4, or may be separately constructed and connected with the bracket as shown in Figs. 5, 6 and 7.

In the construction shown in Figs. 2, 3 and 4, the ring 25 is centrally bored to receive a ball 6 which is held in position by any convenient means as by screws 7. In the upper and lower faces of the ring 25 are formed recesses 8 and 9 respectively. To the end of the horn 5 is secured an extension 10 preferably detachably connected to the end of the horn as by a screw joint 34-35, this extension being adapted to fit and move readily upon the upper surface of the ball 6 and to be held in place by a ring 11 bearing upon its upper face.

The curved end or elbow 4 of the reproducer arm is provided with a flange 37, adapted to fit and move readily upon the lower surface of the ball 6 and to be held in place by a ring 12 bearing against its lower surface. The rings 11 and 12 may be held in place as shown in Figs. 2 and 3, by means of thumb screws 13, or the rings may be screw-threaded as shown at 14, to engage screw threads 15, formed in the recesses 8 and 9. The ball 6 is provided with a central vertical bore 16 which may be substantially cylindrical as shown in Figs. 2 and 4, or may be tapered as shown in Fig. 3, so as to form with the reproducer arm and the horn a passage of gradually increasing diameter from the sound box to the mouth of the horn.

The flange 37 on the end of the reproducer arm is preferably of greater width on the side opposite the free end of the reproducer arm as shown at 38 so as to form a stop adapted to strike the bottom of the recess 9, when the free end of the reproducer arm is off the record disk and thus prevent the free end of the arm from dropping far enough to injure the stylus or sound box.

In operation, the ring 12 will be so set as to hold the flange 37 against the lower surface of the ball 6, but at the same time to permit it to move freely in either a horizontal direction as may be necessary to

permit the stylus to follow the record groove, or in a vertical direction when the free end of the reproducer arm is lifted to permit a record disk to be removed or replaced. The ring 11 will be firmly pressed upon the upper face of the extension 10 by the thumb screws or by the engagement of the screw threads 14—15, so as to hold the horn in any desired position, it being possible to shift the position of the horn by slightly loosening the thumb screws or by unscrewing the ring.

By the construction above described, a simple, inexpensive form of joint is secured which permits the reproducer arm to move freely in any direction and permits the horn to be readily adjusted in any position either horizontally or vertically, and holds it firmly in adjusted position, whatever the movement of the reproducer arm may be, without materially varying the form or character of the sound passage and without interrupting its continuity.

In the construction shown in Figs. 5 to 10 inclusive, instead of the ball 6 fixedly held in the ring 25 as in Figs. 1 to 4 inclusive, a hollow ball 32 is provided having a ring 33 thereon provided with screw threads 34 to engage the screw threads 35 of the end of the horn. This hollow ball 32 fits and is adapted to move readily in a bowl 31' which is provided at its upper end with screw threads 30 to engage screw threads formed on the inner face of a depending flange 29 of the ring 25. The flange 37 of the end of the reproducer arm fits and is adapted to move freely on the outer surface of the bowl 31' and is held thereon by a ring 28 screw-threaded at 27 to engage screw threads formed on the inner face of a depending flange 26 of the ring 25, the inner surface of the ring 28 being so shaped as to form between it and the outer surface of the bowl 32 a recess in which the flange 37 may move freely.

For the purpose of providing means by which the free end of the reproducer arm may be held in raised position if desired the wider portion 38 of the flange 37 is provided on its outer surface with series of indentations 39 adapted to receive the pointed end of a spring pin 40 carried by the ring 28. For the purpose of holding the horn 5 at any desired angle relative to a horizontal plane, the ring 25 may be provided with a set screw 36 carried in a suitable lug on the upper face of the ring and adapted to bear against the outer face of the hollow ball 32 as shown in Fig. 5 or the hollow ball 32 may be provided on its outer face as shown in Figs. 7 and 8 with series of indentations 42 with which the pointed end of a spring pin 41 carried by a lug on the upper face of the ring 25 is adapted to engage.

In assembling the invention in the form shown in Figs. 5 to 10 inclusive, the end of the horn 5 is inserted in the ring 25 from the upper side and the hollow ball 32 is inserted from below and the screw threads 34—35 are caused to engage. The bowl 31' is then secured in position by causing the screw threads 30 to engage the screw threads of the flange 29. The reproducer arm is then placed in position with its flange 37 resting against the outer surface of the bowl 31' and the ring 28 is then secured in position.

It will be noted that in all of the constructions shown, one member of the joint, the ball 6, in Figs. 2, 3, 4 and the bowl 31', in Figs. 5 to 10 inclusive, is fixed, and

forms with the members formed on the ends of the reproducer arm and the horn, a ball and socket joint, the fixed or stationary member in each case having surfaces on which the members carried at the ends of the reproducer arm and the horn have the free movement in any desired direction which is characteristic of the ball and socket joint.

It will also be noted that in all of the constructions shown, the movements of the reproducer arm and horn on the fixed or stationary member are about a common center both as regards their movements in horizontal planes as well as in vertical planes. And it will also be noted that in none of the constructions shown is the sound passage obstructed the sound passage in the construction shown in Fig. 3 being tapered regularly from the reproducer arm to the horn.

In the drawings the applicant has illustrated the basic idea of breaking substantially the center of an amplifying horn, with a flexible joint, so as to allow the free ends thereof to have a vertical movement as well as a horizontal movement; in view of which it is to be understood that the construction of the device may be varied if desired without hindering the commercial value thereof; the right being reserved to use said variations and to use, manufacture and vend, either the connection of the horn, or the connection of the arm separately, if desired, without departing from the spirit of the invention, so long as they are embraced within the scope of the appended claims.

Having thus described the invention what is claimed as new with the protection of Letters Patent is:—

1. In a talking machine a reproducer arm and horn a ball and socket joint connection therebetween to permit both the reproducer arm and horn to have a universal movement.
2. In a talking machine, the combination with the reproducer arm and the horn of a joint connecting the reproducer arm and the horn, comprising a stationary member adapted to form spherical bearings for both the reproducer arm and the horn.
3. In a talking machine, a reproducer arm and horn a ball and socket joint connection between them, comprising a stationary spherical member, a member carried by the reproducer arm cooperating with the stationary member and a member carried by the horn also cooperating with the stationary member.
4. In a talking machine, the combination with the reproducer arm and the horn of a flexible joint connecting the reproducer arm and the horn, comprising a stationary spherical member having separate bearing surfaces adapted to form spherical bearings for the reproducer arm and horn respectively.
5. In a talking machine, the combination with the reproducer arm and the horn of a joint connecting the reproducer arm and the horn comprising a stationary member having separate spherical bearing surfaces for the reproducer arm and the horn respectively and means for holding the horn against movement on the stationary member.
6. In a talking machine, the combination with the reproducer arm and the horn of a joint connecting the reproducer arm and the horn comprising a stationary member having separate spherical bearing surfaces for the reproducer arm and the horn respectively, a ring supporting the stationary member and serving as an abutment to limit the vertical movement of the reproducer arm.
7. In a talking machine, the combination with the reproducer arm and the horn of a joint connecting the reproducer arm and the horn, comprising a stationary member having spherical bearing surfaces, means carried by the horn adapted to fit one of the bearing surfaces, a flange on the end of the reproducer arm adapted to fit the other bearing surface, a ring supporting the stationary member

and means carried by the ring for engaging the flange of the reproducer arm to hold the free end of said arm in raised position.

8. In a talking machine, the combination with the reproducer arm and the horn of a joint connecting the reproducer arm and the horn, comprising a stationary member having spherical bearing surfaces, means carried by the horn adapted to fit one of the bearing surfaces, a flange on the end of the reproducer arm adapted to fit the other bearing surface, a ring supporting the stationary member consisting of a spring pressed pin, and means carried by the ring for engaging the flange of the reproducer arm to hold the free end of said arm in raised position.

9. In a talking machine, the combination with the reproducer arm and the horn, of a joint connecting the reproducer arm and horn comprising a stationary member having spherical bearing surfaces, means carried by the horn adapted to fit one of the bearing surfaces, a flange on the end of the reproducer arm adapted to fit the other bearing surface, and having opposite the free end of the reproducer arm an extension, and a ring supporting the stationary member adapted to form an abutment for the extension of said flange whereby the downward movement of the free end of the reproducer arm is limited.

10. In a talking machine the combination with the reproducer arm and the horn, of a joint connecting the reproducer arm and horn, comprising a stationary ball, means carried by the ends of the reproducer arm, and the horn respectively, adapted to fit and move on opposite bearing surfaces of the ball and means for holding the ends of the reproducer arm and horn against said ball.

11. In a talking machine, the combination with the reproducer arm and the horn, of a joint connecting the reproducer arm and horn, comprising a stationary ball, having an opening therethrough, means carried by the ends of the reproducer arm and the horn respectively adapted to fit and move on opposite surfaces of said ball, and means for holding the ends of the reproducer arm and horn against said ball.

12. In a talking machine, the combination with the reproducer arm and the horn, of a joint connecting the reproducer arm and the horn comprising a stationary spherical shaped member, means carried by the ends of the reproducer arm and the horn adapted to fit opposite bearing surfaces of the spherical shaped member, and means for holding the ends of the reproducer arm and horn against said spherical shaped member.

13. In a talking machine, a reproducer arm and horn, a joint flexibly connecting the arm and horn about a common center.

14. In a talking machine, a reproducer arm and horn, and a flexible common center joint connecting between them, said joint having means to limit the downward movement of the horn.

15. In a talking machine, an amplifying horn and a flexible ball joint breaking at a point between the ends.

16. In a talking machine, an amplifying horn and a common center joint breaking at a point between the ends thereof, so as to allow the free ends to have vertical and horizontal movements.

17. In a talking machine, the combination with the reproducer arm and horn, of a joint connecting the reproducer arm and the horn comprising a stationary member having separate spherical bearing surfaces for the reproducer arm and the horn respectively and means to prevent downward movement of the horn.

18. In a talking machine, a reproducer arm and horn having a joint pivotally connecting them about a common center so as to permit them vertical and horizontal movements.

19. In a talking machine, a reproducer arm and horn, a joint pivotally connecting them about a common center, comprising a stationary member having spherical bearing surfaces, means carried by both the arm and horn to move universally upon the spherical bearing surfaces, and said means of the arm having means to limit the downward movement thereof.

20. In a talking machine, a reproducer arm and horn, a joint pivotally connecting them about a common center, comprising a stationary member having spherical bearing surfaces, means carried by both the arm and horn to move

universally upon the spherical bearing surfaces, said joint having means to limit the downward movement of both the reproducer arm and horn.

21. In a talking machine, a reproducer arm and horn, a joint connecting them together, comprising a stationary spherical bearing member and means carried by the horn to move universally upon said stationary spherical bearing member.

22. In a talking machine, a reproducer arm and a horn, a joint connecting them together, comprising a stationary spherical bearing member, and means carried by the reproducer arm to move universally upon said stationary spherical bearing member.

23. In a talking machine, a reproducer arm and horn, a joint connecting them together, comprising a spherical bearing member, means carried by the reproducer arm to move universally upon said spherical bearing member, and said means having means to limit the downward movement of the reproducer arm.

24. In a talking machine, a reproducer arm and horn, a joint connecting them together, comprising a spherical bearing member, means carried by the horn to move universally upon said spherical bearing member, and said joint having means to limit the downward movement of the horn.

25. In a talking machine, a reproducer arm and horn, a flexible joint connecting them together, comprising a stationary bearing member, said arm and horn having means to move universally upon said stationary bearing member.

26. In a talking machine, a reproducer arm and horn, a flexible joint connecting them together comprising a stationary bearing member, said arm and horn having means to move universally upon said stationary bearing member and said joint having means to limit the downward movements of the arm and horn.

27. In a talking machine, an amplifying horn having a flexible joint breaking at a point between the ends thereof comprising a stationary bearing member and the sections of the said horn on opposite sides of said bearing member having means to move universally upon said stationary bearing member.

28. In a talking machine, a sound conveying tube having a flexible joint breaking at a point between the ends thereof comprising a stationary bearing member, the sections of the said sound conveying tube upon opposite sides of said bearing member having means to move universally upon said stationary bearing member and said joint having means to limit the downward movement of the free ends of the sound conveying tube.

29. In a talking machine, a sound conveying tube having a joint breaking at a point between the ends thereof, comprising a spherical stationary bearing member and the sections of the said sound conveying tube on opposite sides of said bearing member having means to move universally upon said spherical stationary bearing member.

30. A talking machine comprising a relatively stationary member having separate bearings and a reproducer arm and horn operatively connected to said bearings, each to swing horizontally and vertically thereon.

31. A talking machine comprising a relatively stationary member having separate bearings and a reproducer arm and horn flexibly connected to said bearings, each to swing universally thereon.

32. In a flexible amplifying horn, a joint located at a point between the free ends thereof comprising a stationary bearing member, said free ends of the horn having universal movements upon said stationary member.

33. In a flexible jointed amplifying horn, a joint located between the free ends thereof comprising a stationary spherical bearing member operative to allow for universal movements of the free ends of the horn, and means to limit the downward movement of the horn.

34. In a flexible jointed amplifying horn, a joint located between the free ends thereof comprising a spherical bearing member so as to allow for universal movements of the free ends of the horn, and means for holding the free ends to said spherical bearing member.

35. A talking machine comprising a relatively stationary member having a spherical bearing, and a horn flexibly connected to said bearing so as to have a universal movement.

36. A talking machine comprising a reproducer arm and horn; an operative connection therebetween; each of said parts having a universal movement about said connection.

5 37. In a talking machine; a horn support; a reproducer arm and horn connected thereto upon a common center to have universal movements.

10 38. A reproducer arm and horn; comprising a connection therebetween to permit both the arm and horn to move universally about said connection upon a common center.

39. A talking machine comprising a reproducer arm and horn; an operative connection therebetween; each of said

parts having a universal movement about said connection; said connection having means to limit the downward movement of the arm and horn.

40. In a talking machine, a reproducer arm and horn; and a ball and socket joint therebetween.

In witness whereof, the applicant's signature is hereunto affixed in the presence of two witnesses.

ROBERT A. BOSWELL.

Witnesses:

ROBERT S. BOSWELL,

FRANK A. HARRISON.

No. 859,165.

PATENTED JULY 2, 1907.

R. A. BOSWELL.
SOUND CONVEYING TUBE FOR TALKING MACHINES.

APPLICATION FILED OCT. 7, 1905.

3 SHEETS—SHEET 1.

Fig. 1.

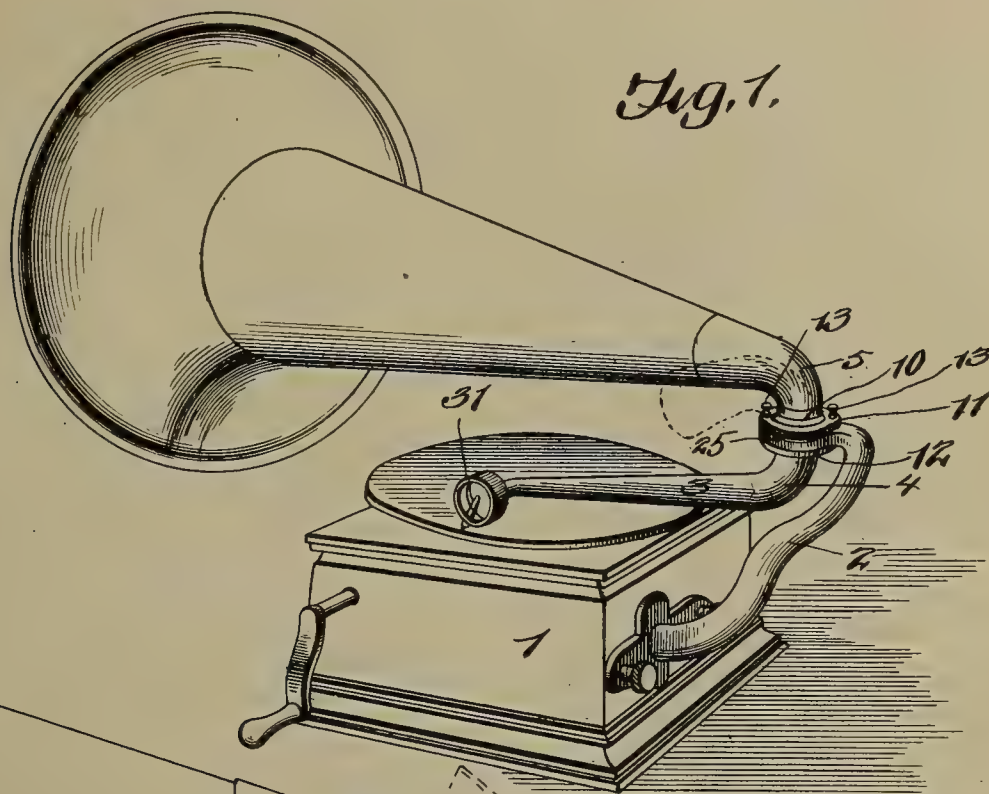
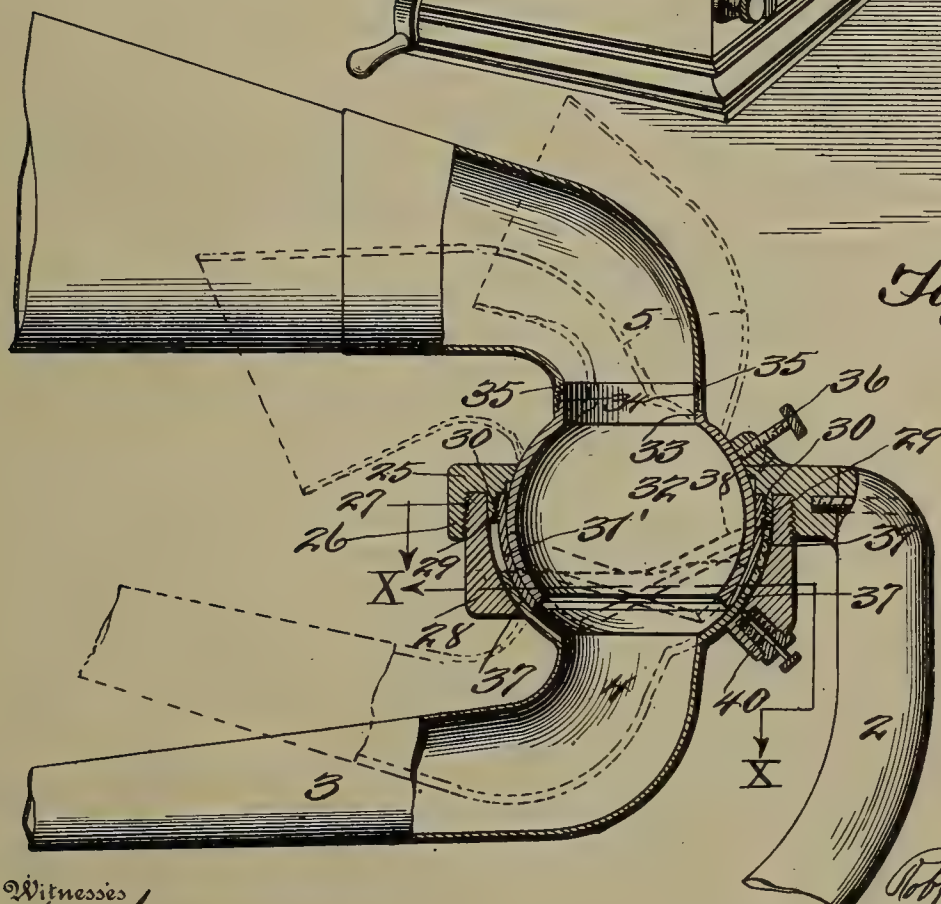


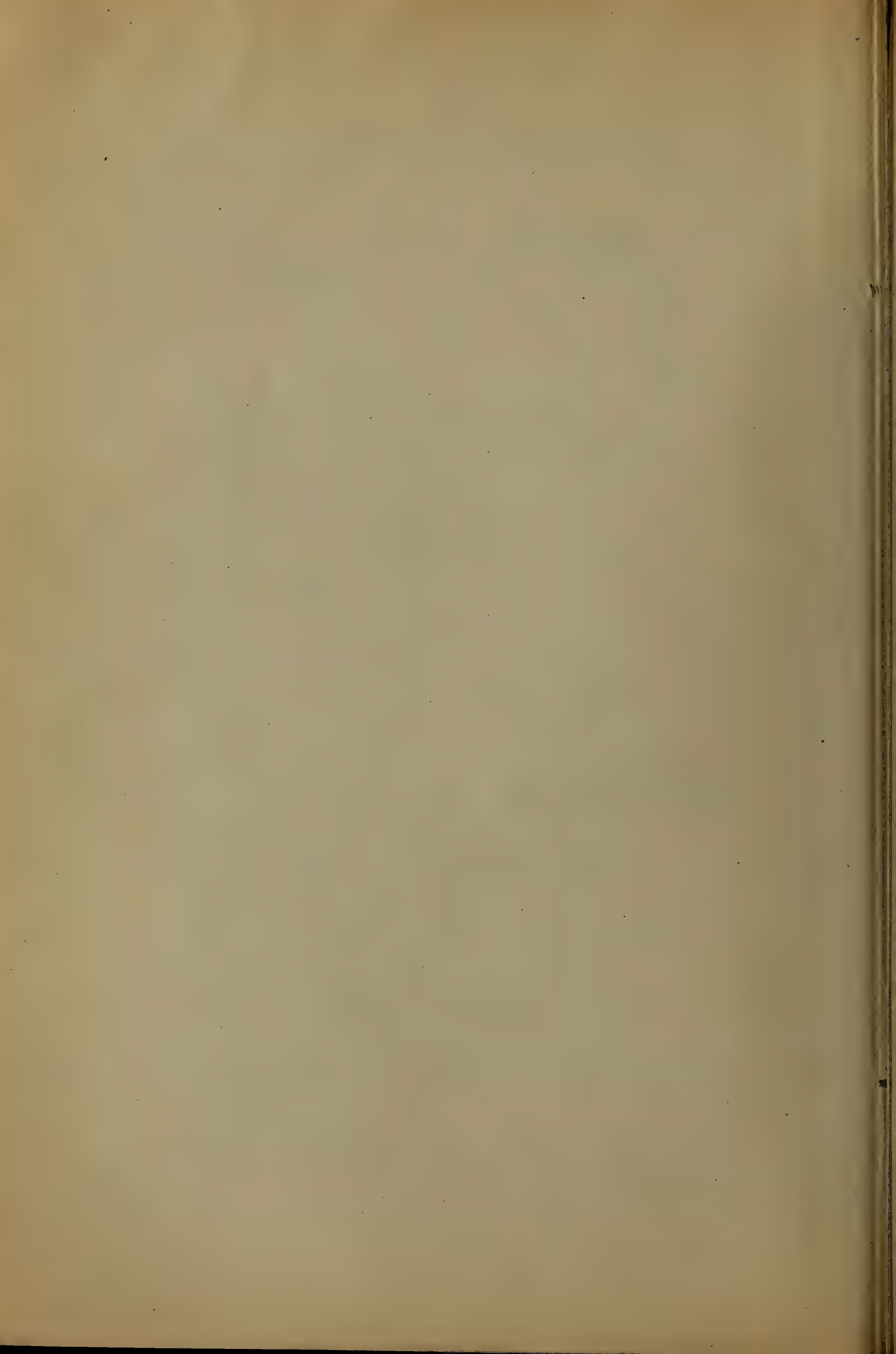
Fig. 5.



Witnesses
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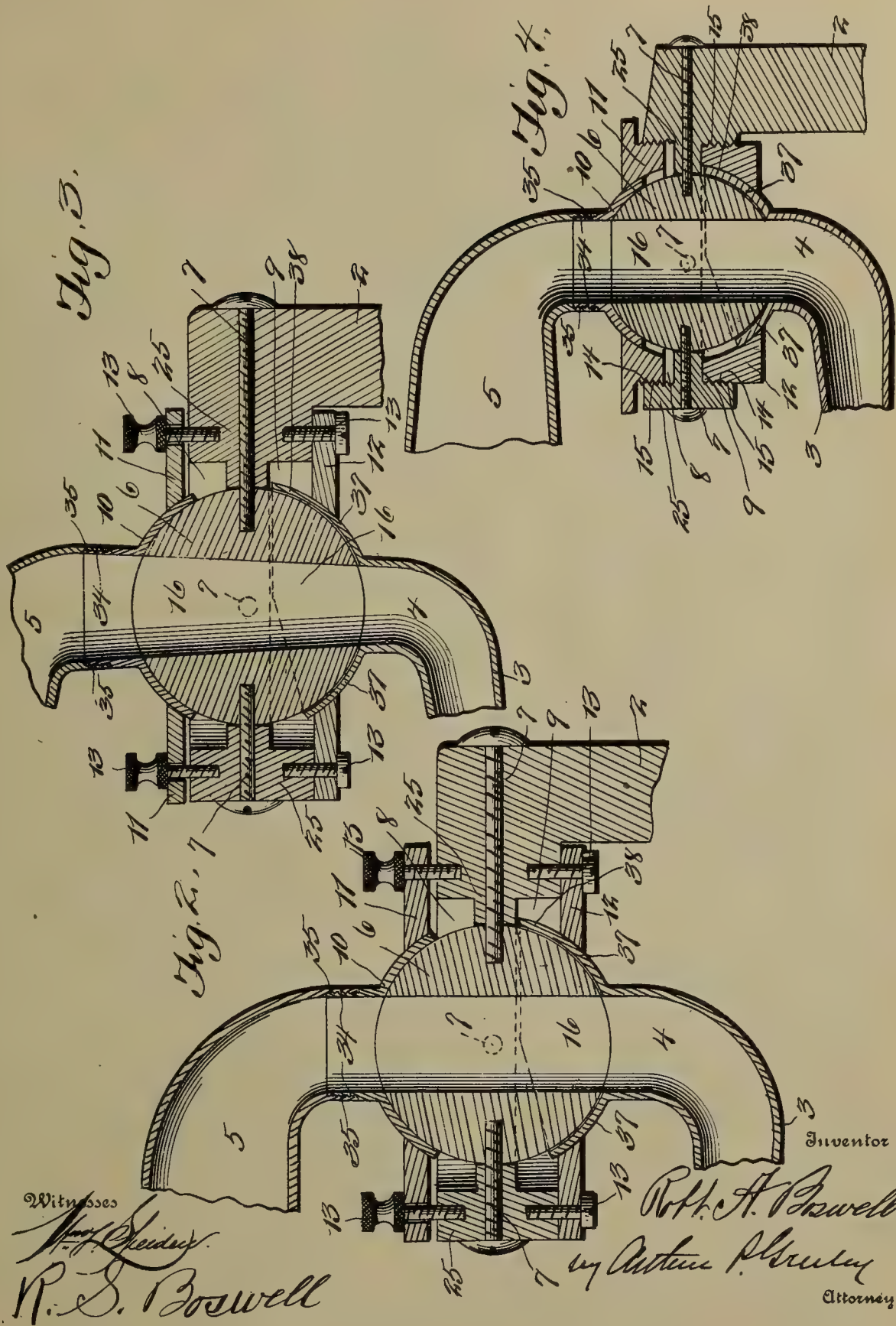
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R. A. BOSWELL.
SOUND CONVEYING TUBE FOR TALKING MACHINES.
APPLICATION FILED OCT. 7, 1906.

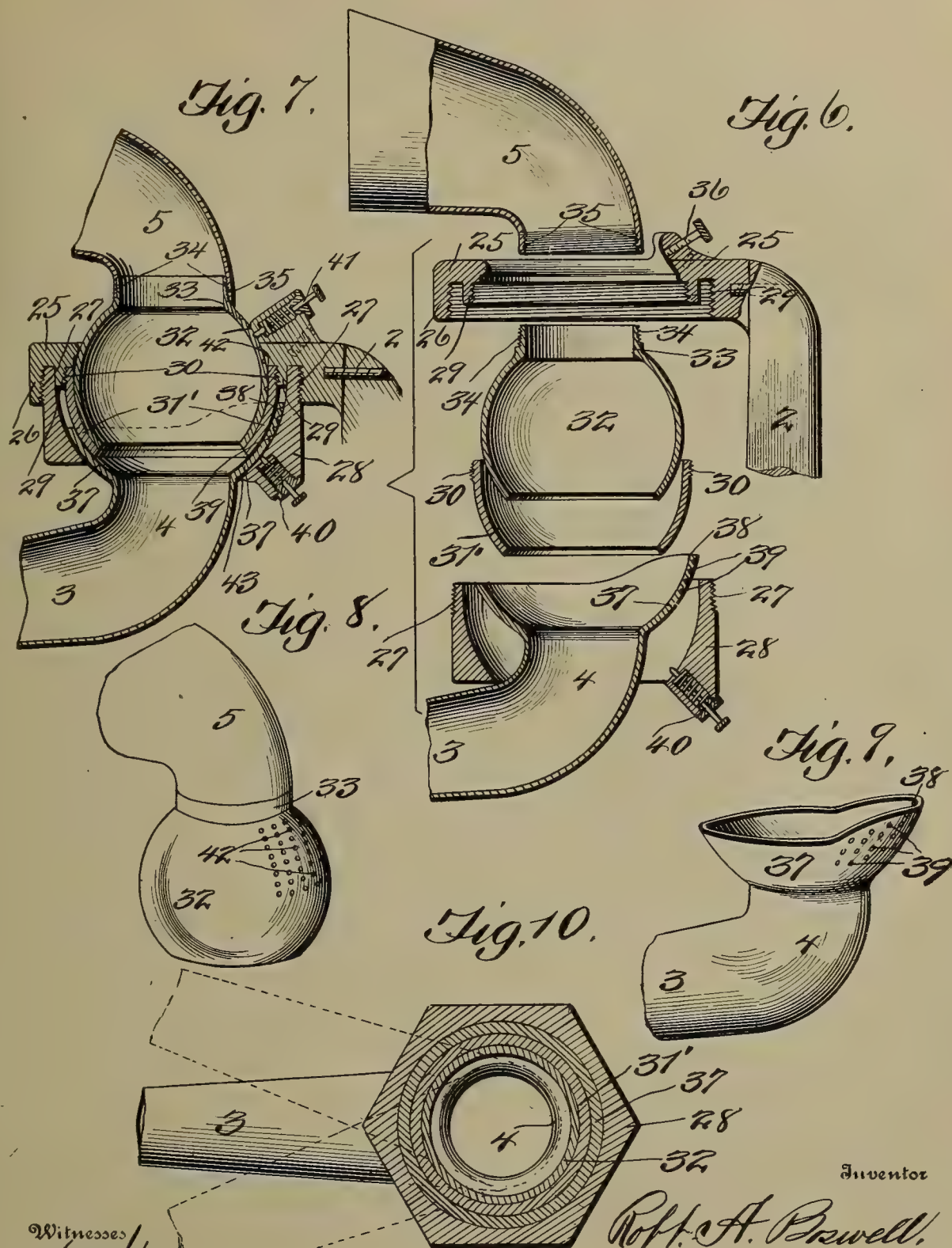
3 SHEETS—SHEET 2.



R. A. BOSWELL.
SOUND CONVEYING TUBE FOR TALKING MACHINES.

APPLICATION FILED OCT. 7, 1906.

3 SHEETS—SHEET 3.



Inventor

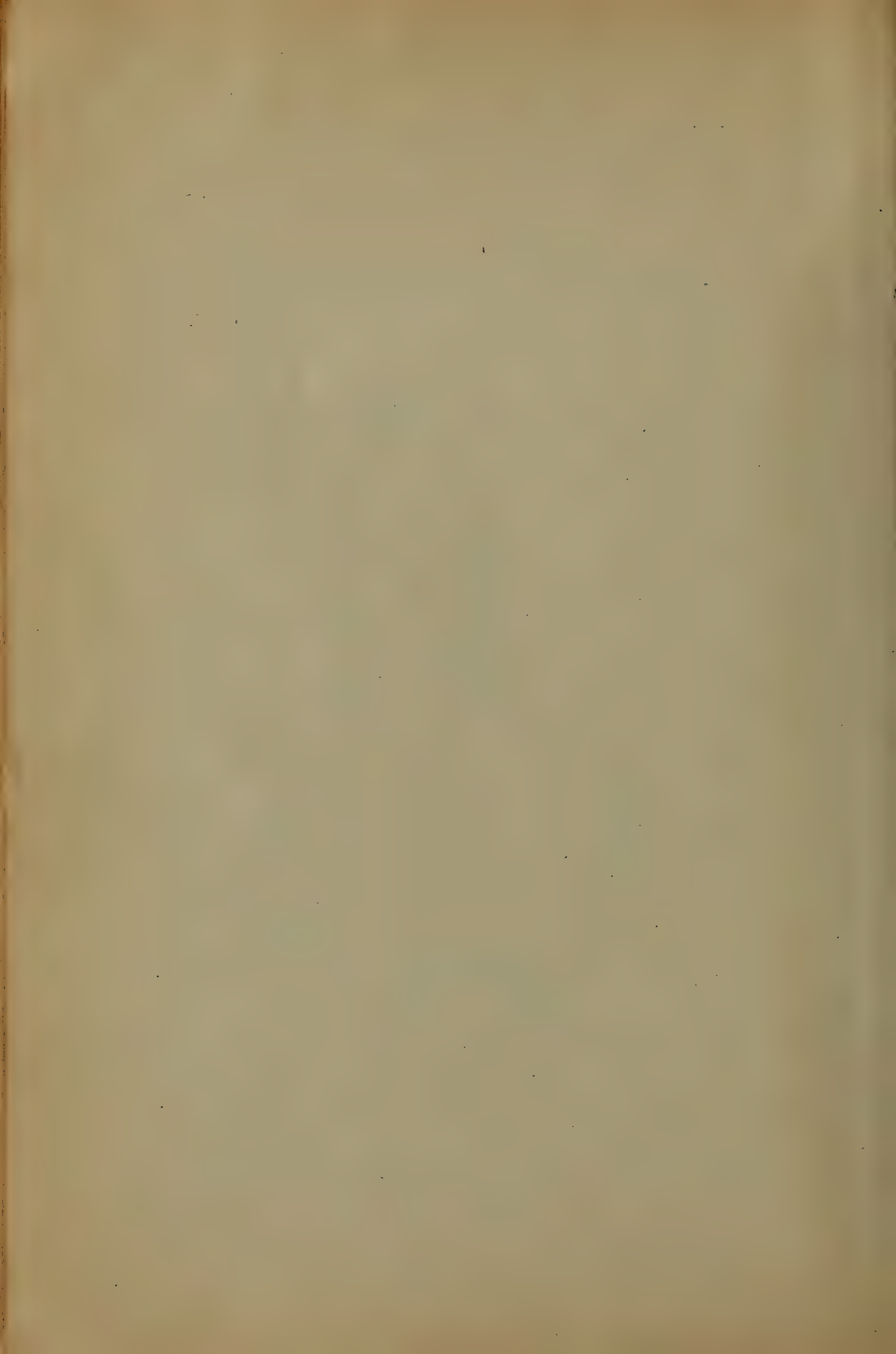
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By

Arthur P. Boswell
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Witnesses

W. L. Boswell
R. S. Boswell.



UNITED STATES PATENT OFFICE.

WILHELM RABE AND CARL KAMRATH, OF NEW YORK, N. Y., ASSIGNORS TO LANDAY BROTHERS, OF NEW YORK, N. Y., A COPARTNERSHIP.

TALKING-MACHINE.

No. 859,180.

Specification of Letters Patent.

Patented July 2, 1907.

Application filed April 5, 1906. Serial No. 310,172.

To all whom it may concern:

Be it known that we, WILHELM RABE and CARL KAMRATH, both subjects of the Emperor of Germany, residing in the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

Our invention relates particularly to machines of the flat record type and consists in means for adapting such machines to the making and reproducing of "home" records, and to that end they are here shown, and are preferably constructed so as to be applicable to the ordinary machines now in use, and intended for use only in reproducing commercially made records.

Our object has been to produce a mechanism simple and cheap in construction, convenient and certain to operate, of great amplitude of movement so as to be applicable to records of various sizes, accurately adjustable to the work to be done and smooth and noiseless in action.

In the accompanying drawings, the mechanism is shown arranged for the production of records of the graphophone type, wherein the sound waves are recorded and reproduced by vertical movements of the stylus, but we do not intend to limit the scope of the invention to that use.

In said drawings, Figure 1 is a plan view of our improved mechanism with so much of the parts of an ordinary talking machine as is necessary to an understanding of the same. Fig. 2 is a vertical, sectional elevation thereof taken on the planes indicated by the dotted lines 2—2, Fig. 1.

At 1, we have shown a disk preferably made of such material as is suitable for the production of "home" records, such as wax or wax composition of sufficient softness.

2 is the centering stud of the turn table of any usual or preferred construction of talking machine and 3 the horn connecting arm of any usual or preferred construction and supported in any preferred way.

4 is a sound box, two of which are provided with this instrument, in one of which the stylus 5 is of form and mounting adapting it for recording and in the other of form and mounting adapting it for reproducing and the two sound boxes are also modified in construction otherwise in customary manner adapting them to their individual functions. The sound box has a neck 6, whereby it may be slipped upon a joint member 7, the connection being such as to prevent horizontal play in the recording sound box, and permit slight horizontal play in the reproducing sound box. By horizontal is meant play in a plane parallel to the face of the record. The coupling member 7 is attached as by the trunnion pin 8 to an angle tube 9

in such manner as to permit vertical play of the sound box and the angle tube 9 is removably connected to the horn arm 3 by a bayonet joint as shown at 10.

To regulate the pressure of the stylus upon the record, we provide a weight 11 adjustable upon a wire or rod 12, which is fastened to the neck of the sound box or to the coupling member 7. The weight may be moved toward or away from the fulcrum or pivotal point of the sound box upon the angle tube 9 so as to make the impression of the stylus as light or as heavy as desired.

13 is a wheel or ring, preferably of metal, and having the crown spiral 14 and located upon the record 1 concentric with its centering stud 2. It may be removably attached as by the slight points or projections 15 engaging the soft surface of the record or may be otherwise fastened as preferred.

Engaging the crown spiral 14 is an arm 16 which is fastened to the angle tube 9 and is preferably bent in the arc of a circle whose center is the pivotal point of the horn or arm 3. Preferably also, the arm 16 is made of a backing strip 16^a of metal and a facing strip 16^b of vulcanized fiber or other sufficiently hard and non-metallic material, the backing affording the necessary strength to the arm and the facing insuring the noiseless engagement of the arm with the crown spiral. On the under edge of the arm and preferably only on the facing portion 16^b thereof, which portion projects below the metal backing for that purpose, are a series of grooves or teeth 17 preferably curved to conform to the curves of the spiral 14, so as to accurately engage the same.

It will be seen that when the round disk 1 of suitable material is placed in the revolving table of a talking machine, the crown spiraled wheel and the recording mechanism put in position, and the table started in rotation, the recording stylus will travel around the disk in a spiral path caused by the engagement of the successive teeth of arm 16 with the crown spiral and that a record may be produced in a well-known manner in the spiral groove so formed which may be reproduced merely on substitution of a reproducing sound box for the recording sound box. The arm 16 and crown spiral guide the sound box positively during both operations and so preventing the accidental dislodgment of the stylus from the record groove.

It is apparent that the amplitude of movement of the arm 16 is considerable and that records of various sizes can be made and that by slightly canting the arm 16 so that when at the extreme inner position, said arm will slide above the far side of the crown spiral, still greater amplitude of movement may be provided for.

The connection provided by the arm 16 and crown spiral is so positive that the mechanism will operate properly even if the record and machine be not exactly level.

Having thus described the invention what we claim as new and desire to secure by Letters Patent is:—

5 1. In a talking machine, the combination of a sound conveying horn-connection mounted to vibrate in a plane parallel with the record-tablet, a sound box suitably connected to said horn-connection, a guiding arm for the sound box curved in an arc concentric with the pivot of the horn and having a series of grooves or projections on its under face, a record-tablet and an annular crown spiral carried by the record-tablet and engaged by the 10 grooves or projections on the under face of the guiding arm, substantially as described.

15 2. In a talking machine, the combination of a flat record-tablet, an annular crown-spiral having projections to engage with the record-tablet to which it is applied, a sound-conveying horn-connection mounted to vibrate in a plane parallel with the record-tablet, a sound box suitably connected with the said sound conveying horn-connection and an arc shaped arm mechanically connected to the 20 sound box and having a series of grooves or projections on its under face engaging the crown-spiral and imparting to the sound-box radial movement relatively to the record-tablet by the rotation of the latter, substantially as described.

25 3. In a talking machine, the combination of a flat horizontal record-tablet rotating on a vertical axis, a sound conveying horn-connection mounted to vibrate on a vertical axis, a sound-box connected with said horn-connection, an annular crown-spiral carried by the record-tablet and a guiding arm mounted on the sound-conveyer and having 30 a series of grooves or projections on its under face engaging with the annular crown-spiral so as to impart movement to the sound-box radial to the record-tablet, by the rotation of the latter, substantially as described.

35 4. In a talking machine, the combination of a rotary record-tablet, an annular crown-spiral mounted thereon, a sound-conveyer mounted to vibrate in a plane parallel with the record-tablet, a sound-box connected with said sound conveyer and a guiding arm mounted on the sound-conveyer having a metallic back and a non-metallic face 40 with a series of projections engaging with the crown-spiral so as to impart to the sound-box movement radial to the record-tablet, by the rotation of the latter, substantially as described.

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Witnesses:

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W. RABE & C. KAMRATH.

TALKING MACHINE.

APPLICATION FILED APR. 5, 1906.

Fig. 1.

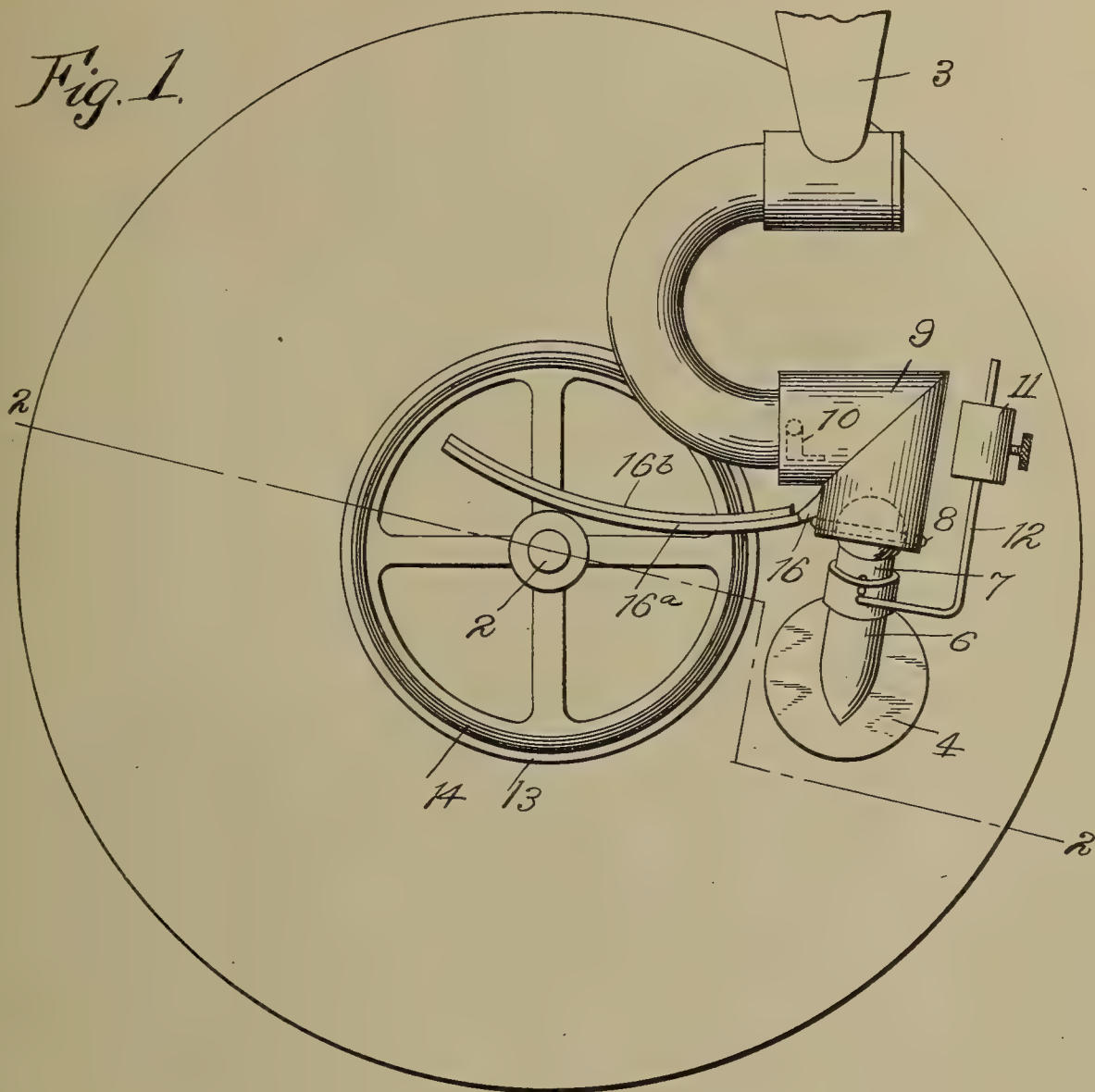
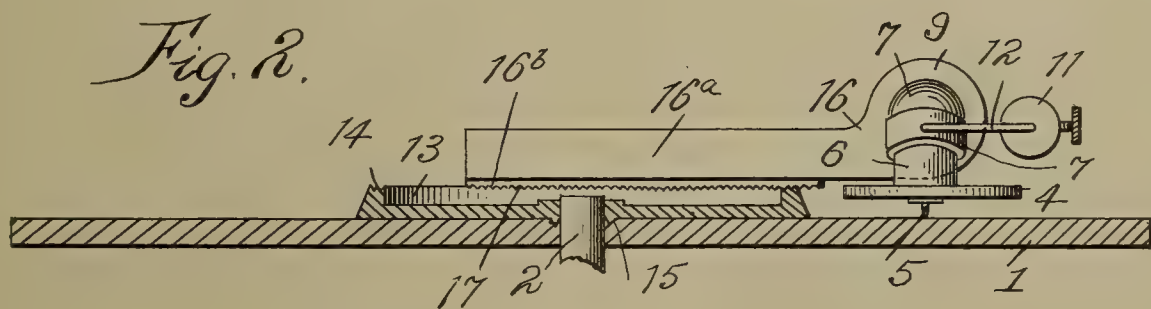


Fig. 2.



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Wilhelm Rabe
Carl Kamrath
By their Attorneys
Ames & Co.

UNITED STATES PATENT OFFICE.

CLARENCE HAMILTON WILKES AND HOWARD LYKE, OF LITTLE FALLS, NEW YORK.

STARTING AND STOPPING MECHANISM FOR PHONOGRAPHS.

No. 860,110.

Specification of Letters Patent.

Patented July 16, 1907.

Application filed October 17, 1906. Serial No. 339,316.

To all whom it may concern:

Be it known that CLARENCE HAMILTON WILKES and HOWARD LYKE, citizens of the United States, residing at Little Falls, in the county of Herkimer and State of New York, have invented certain new and useful Improvements in Starting and Stopping Mechanism for Phonographs, of which the following is a specification.

This invention relates to starting and stopping mechanisms for phonographs.

10 It has for an object to provide a means connected to the starting lever and operated automatically either by the closing and the opening of the gate or by the shifting of the lock for the gate.

15 Other and further objects will appear in the following description and will be more particularly pointed out in the appended claims.

In the drawings:—Figure 1 is a front elevation of one embodiment of our invention, and Fig. 2 is a front elevation of another embodiment of our invention.

20 In the embodiment shown in Fig. 1, 1 indicates the record cylinder, 2 the cylinder frame, 3 the bed plate, 4 the pivoted starting lever, 5 the motor shaft, 5' the motor, 6 the brake disk and 7 the hinged gate, all of which are of any desired construction.

25 Positioned below the front end of the gate 7 when the gate is in closed position, is the upper beveled end 8 of a vertically movable plunger or trip 9 which works through an opening in the bed plate and is pivoted at its lower end to one arm of a bell crank lever 10 suspended from the underside of the bed plate by a hanger 11. The other arm of the bell crank lever is pivotally connected to a link 12 which in turn is pivotally connected to the starting lever 4. It is apparent that when the gate is closed it will ride on the upper beveled end of the plunger 9 and depress the same, which in turn, through the bell crank lever 10 and link 12, will shift the starting lever and release the motor shaft. When the gate is opened to remove the cylinder, the plunger will rise under the action of a coil spring 13 interposed between the bed plate and the headed and beveled upper end 8 of the plunger 9, thus shifting the starting lever to stop the motor shaft.

35 In the embodiment shown in Fig. 2, the known construction of the machine may be the same except that the gate is held closed by a manually operated cam lock 14 which is also old in the art. To this manually operated cam lock there is pivoted the upper end of a

plunger 9^a which extends through an opening in the bed plate and is swiveled to one end of a bell crank lever 10^a hung from the under side of the bed plate by a hanger 11^a. A link 12^a connects the starting lever 4 and the bell crank lever 10^a. The starting and the stopping is in this latter embodiment positively controlled by the gate lock.

It will be noted that all parts of our invention, with the exception of the upper end of the plunger 9 or 9^a, are mounted below the bed plate and are thus out of the way of the operator.

In both embodiments, a part of the gate either the gate body or the gate lock controls the plunger and consequently the starting lever, both on opening and on closing the gate.

Having thus described our invention, what we claim and desire to secure by Letters Patents, is:—

1. In a starting and stopping mechanism for phonographs, the combination with the starting lever, a gate part, a motor shaft, a brake disk upon the shaft; of a plunger controlled by the gate part, a bell-crank lever connected to the plunger, and a link connecting the bell-crank and the starting lever to operate the latter with respect to the brake disk upon opening or closing of the gate.

2. In a starting and stopping mechanism for phonographs, the combination with the bed plate, the starting lever and a gate part, of means connected to the starting lever below the bed plate and controlled by the gate part.

3. In a starting and stopping mechanism for phonographs, the combination with the bed plate, the starting lever and the gate part, of a spring actuated plunger operated by the gate part, a bell crank lever hung from the under side of the bed plate and connected to the plunger, and a link connecting the bell crank lever and the starting lever.

4. In a starting and stopping mechanism for phonographs, the combination with the starting lever, and a gate part, of a plunger controlled by the gate part, a bell crank lever connected to the plunger, and a link connecting the bell crank lever and the starting lever.

5. In a phonograph, a motor for operating the phonograph, a gate for the phonograph cylinder, means connecting the said gate with the motor, whereby the motor is started and stopped by operating the gate.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

CLARENCE HAMILTON WILKES.
HOWARD LYKE.

Witnesses:

CHARLIE NETHANAY,
ARTHUR W. HYDE.

No. 860,110.

PATENTED JULY 16, 1907.

C. H. WILKES & H. LYKE.
STARTING AND STOPPING MECHANISM FOR PHONOGRAPHS.
APPLICATION FILED OCT. 17, 1906.

Fig. 1.

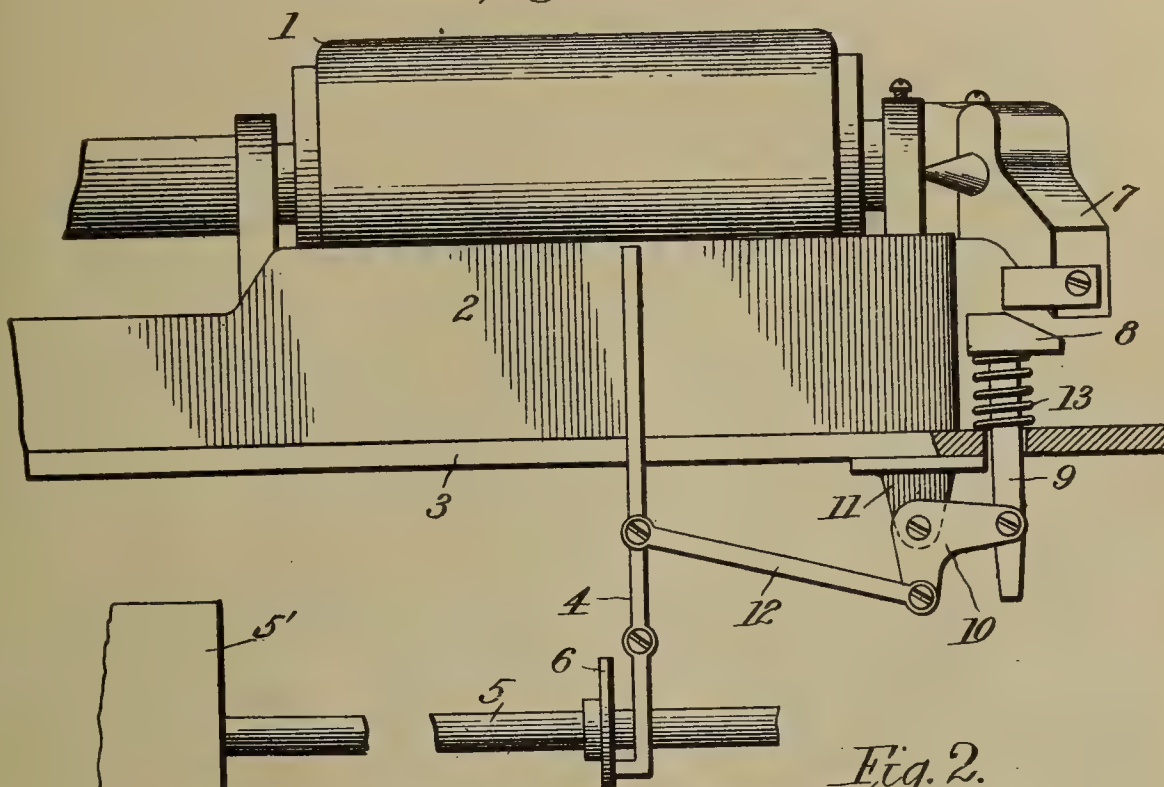
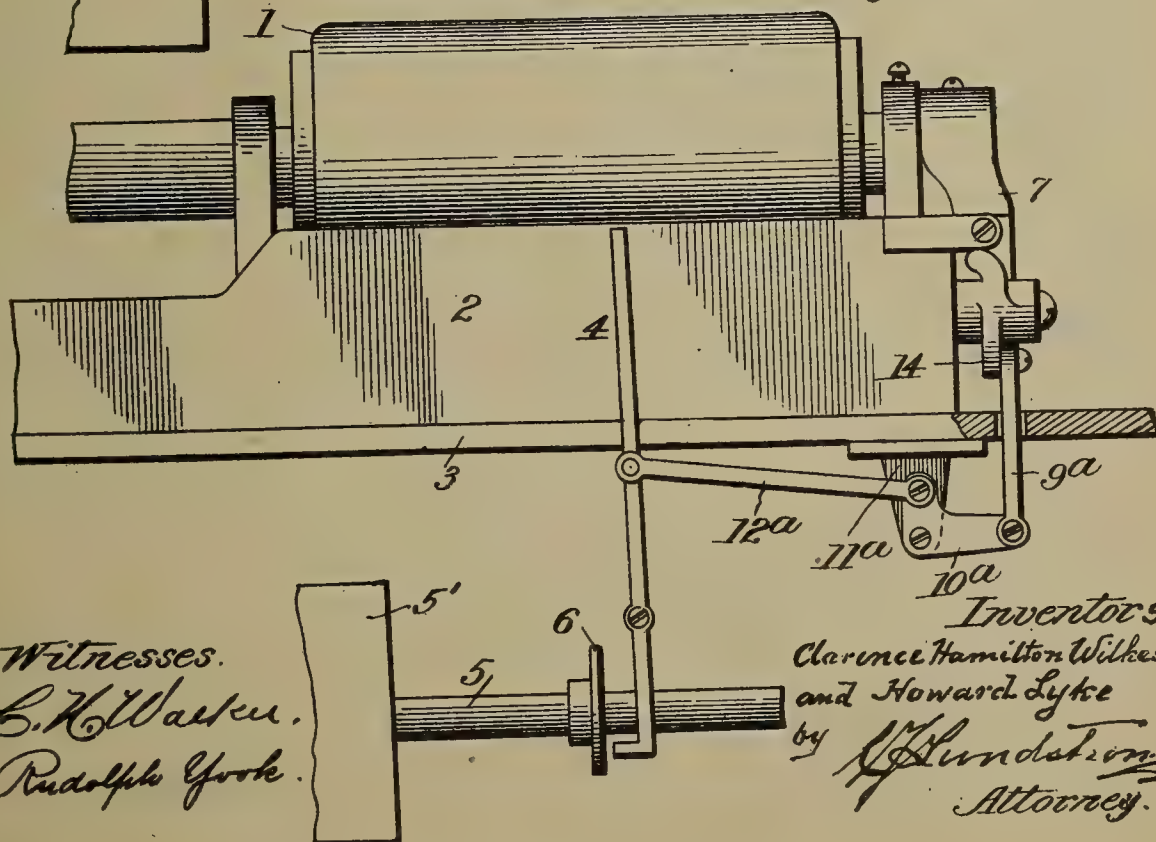


Fig. 2.



Witnesses.

C. H. Wilkes.
Rudolph York.

Inventors.
Clarence Hamilton Wilkes
and Howard Lyke
by *Clarence Hamilton*
Attorney.

UNITED STATES PATENT OFFICE.

WALTER C. RUNGE, OF CAMDEN, NEW JERSEY, ASSIGNOR TO INTERNATIONAL ROYAL PHONE COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

ADJUSTABLE REPRODUCER-ARM FOR TALKING-MACHINES.

No. 860,332.

Specification of Letters Patent.

Patented July 16, 1907.

Application filed August 18, 1906. Serial No. 331,159.

To all whom it may concern:

Be it known that I, WALTER C. RUNGE, a citizen of the United States, residing in Camden, Camden county, New Jersey, have invented a new and useful
5 Improvement in Adjustable Reproducer-Arms for Talking-Machines, of which the following is a specification.

My invention relates to reproducer arms for talking machines using different mandrels of various diameters
10 on a mandrel shaft having a fixed position and in which the reproducer is shifted with respect to the sound record by adjusting the arm instead of shifting the mandrel shaft as in previous machines.

One of my objects is to provide mechanism by
15 means of which the reproducer can be shifted with respect to the mandrel shaft so that records and mandrels of different diameters may be used on the same machine.

Another object is to provide means whereby the re-
20 producer stylus will be automatically placed in proper position on records of various diameters.

Another object is to provide means for placing the reproducer into or out of operative engagement with the record regardless of the diameter of the latter or the
25 position of the arm.

Another object is to provide means for guiding a reproducing trumpet along the record in such manner that it will be free to move universally under irregularities in the record but will hold the stylus firmly in
30 the sound groove.

I attain my objects in the manner shown in the accompanying drawings of my preferred form of mechanism in which

Figure 1 is a top view of a graphophone provided
35 with my improved adjustable reproducer arm; Fig. 2 a side view of a portion of the structure of Fig. 1; Fig. 3 a side view of a portion of the structure of Fig. 1; with the raising and lowering device down; Fig. 4 a corresponding view with the raising and lowering device up;
40 Fig. 5 a side view of the arm in conjunction with a record of large diameter; Fig. 6 a top view of a slight modification of the arm in conjunction with a record of small diameter; Fig. 7 a side view of the structure of Fig. 6; Fig. 8 a side view of the structure of Figs. 6
45 and 7 in conjunction with a record of large diameter; Figs. 9 and 10 detail views of a form of manually operated lever system; Fig. 11 a detail view of a sound box holder mounted on the arm in place of the trumpet yoke.

50 Like reference characters designate like parts throughout.

As shown in the drawings the talking machine is in the form of the well known graphophone using cylindrical records and comprises a base plate 1, a side frame

2 secured thereto, carrying a mandrel shaft 3 revolubly 55
mounted thereon in a fixed position. A feed screw 5 provided with a pinion 6 is carried by the side frame 2 at one end and an end frame 7 at the other. This feed screw is protected by a slotted or split tube 8 60
surrounding it which tube also acts as a rail for the carriage to slide on. A gear 4 on the frame 2 meshes with the pinions 6 and 9 thereby causing the feed screw and mandrel to revolve in the same direction at pre- 65
determined relative rates of speed. A slide rod 10 is secured to the frame 2 and 7 in front of the feed screw and acts as the second rail for the carriage. The mandrel shaft is adapted to receive mandrels of different diameters as 11 and 12 which are held in position by a thumb nut 13. Sound records 14 and 15 are adapted 70
to be placed on these mandrels.

The reproducer arm comprises a carriage made up of a sleeve 16 provided with a boss or stop 22 and is slidably mounted on the rod 10. A yoke block 17, provided with a roller 18 on its lower horn, is loosely 75
mounted on the sleeve 16 and straddles the split tube 8, the roller running on the under side thereof. A bell crank 19 is secured to the yoke 17 and is provided with a knife edge 20 adapted to engage the feed screw 5 through the slot in the tube 8, being held in engagement therewith by a spring 21. A finger piece 23 is 80
fixed to the sleeve 16 and is partially revoluble therewith, the recess 24 in the yoke block limiting the motion. A cam or projection 25 engages the bell crank 19 for the purpose of throwing the knife 20 out of en- 85
gagement with the feed screw 5. It is apparent that the carriage way comprises two tracks one of which incloses the feed screw thereby simplifying and cheapening the construction.

A swinging bracket 26 is also loosely mounted on the 90
sleeve 16 and is limited in its movement by the slot 27 which engages a lock screw 28 on the yoke block 17. The outer end of the bracket 16 is provided with a guide 29 hinged thereto. A slide bar 30 reciprocates in the guide and terminates in a reproducer holder 95
which may be either a pair of elastic fingers 31, 31 or a sound box holder 32.

A compound lever system connects the end of the bar 30 to the yoke block 17. This comprises a lever 33 pivoted to the bracket 26 with the long end pivoted to 100
the inner end of the slide bar 30. A link 34 connects the short end of the lever 33 and the carriage. On raising or lowering the bracket 26 the slide bar 30 is moved in or out in the guide 29, the bend therein acting as a stop to limit the forward motion. 105

To raise or lower a reproducer so its stylus will be in or out of operative engagement with a record a yoke 35 is hinged to the slide bar 30, the hinge acting as a stop to limit the rearward motion. A second lever

system is provided to oscillate this yoke and comprises a link 36 pivoted to a lug on the yoke, a lever 37 pivoted to the parts 33 and 34 at one end and to the link 36 at the other and a link 38 pivoted to the lever 37 at a point between its ends and to a lug on the finger piece 23. This second lever system may be replaced by a single bent lever 39 connecting the yoke 35 and finger piece 23 which may be extended and slotted to receive it as shown in Figs. 6, 7 and 8. As shown in Fig. 11 the yoke 35 may engage a sound box holder 32.

Figs. 9 and 10 show manually operated means for lengthening or shortening the second lever system. The two bars 40 and 41 telescope on each other through the tube 42. The bar 41 carries a slotted piece 43 while the lever 44, provided with a pin engaging the slot, is pivoted to the bar 40. On throwing the lever 44 from one side to the other of the slotted piece the length of the lever system will be varied. It is apparent that when the finger piece is moved up or down the yoke 35 will be oscillated and the trumpet 45 or the sound box holder 32 will be raised or lowered, throwing the stylus into or out of operative contact with the record.

In use on a small record the bracket 26 is pushed down as shown in Figs. 1, 2, 3, 4 6 and 7, bringing the yoke 35 and elastic fingers 31 over the proper position on the small record 14, the bracket being locked in position by the screw 28. To lower the stylus onto the record the finger piece is raised as shown in Figs. 1, 2, 3, 6 and 7 turning the yoke 36 down, the cam 25 moving to allow the knife edge 20 to engage the feed screw 5 which propels the entire reproducer arm across the machine. At the end of the record the operations are reversed and the arm slid back into its initial position.

If a record of large diameter is to be played the small mandrel is replaced by a large one and the lock screw 28 loosened so the bracket 26 can be raised, being re-locked in its new position. Simultaneously with the raising of the bracket 26 the slide bar 30 is moved transversely with respect to the mandrel shaft by the action of the first lever system so that the stylus will occupy its proper position on the large record. As the distance between the yoke 35 and the finger piece 23 has increased the effective length of the second lever system must be increased and this is effected by the increased throw of the parts 36, 37 and 38 or by the change in the relative locations of the pivotal points of the bent lever 39 of Figs. 6, 7 and 8 or by manually lengthening the lever as shown in Figs. 9 and 10. The stylus is raised and lowered on the large record exactly as it was on the small one and the knife edge is affected in precisely the same manner. The elastic fingers 31 serve to guide the trumpet stylus across the record but yield when irregularities occur permitting the stylus to follow the record groove. The lock screw fastens the bracket 26 firmly to the sliding carriage so there is no play or vibration of the parts when in use. The carriage slides freely along the slide rod 10 and the tube 8, the roller 18 reducing the friction. As the knife edge 20 is held in contact with the feed screw by the spring 21, irregularities or eccentricities in the carriage movement do not affect the feeding of the reproducer across the record.

I claim:—

1. A reproducer arm for talking machines comprising a carriage slidably mounted on the machine; a bracket mounted on the carriage; a slide bar mounted on the outer end of the bracket; means for raising and lowering the bracket; and means for simultaneously shifting the bar transversely with respect to the mandrel. 70
2. An adjustable reproducer arm for talking machines comprising a carriage mounted on the machine; a bracket mounted on the carriage; a slide bar mounted on the outer end of the bracket; means for raising and lowering the bracket; means for simultaneously shifting the slide bar transversely with respect to the machine mandrel; and means for moving the reproducer into or out of operative contact with the record. 75 80
3. An adjustable reproducer arm for talking machines comprising a carriage mounted on the machine; a bracket mounted on the carriage; a slide bar pivotally mounted on the outer end of the bracket; a reproducer holder on the end of the slide bar; a lever fulcrumed on the bracket one end of which is pivoted to the slide bar; a link connecting the other end of the lever and the carriage whereby the slide bar is moved transversely on the upward or downward movement of the bracket. 85 90
4. An adjustable reproducer arm for talking machines comprising a carriage mounted on the machine; a bracket mounted on the carriage; a slide bar pivotally mounted on the outer end of the bracket; a reproducer holder on the end of the slide bar; a first lever fulcrumed to the bracket, one end of which is pivoted to the slide bar; a link connecting the other end of the lever and the carriage whereby the slide bar is moved transversely with respect to the mandrel on the upward or downward movement of the bracket; a finger piece on the carriage; a second lever fulcrumed on the first lever; a link connecting the finger piece and second lever; a yoke mounted on the slide bar; and a link connecting the second lever and yoke whereby the yoke is oscillated on a movement of the finger piece. 95 100
5. An adjustable reproducer arm for talking machines comprising a carriage mounted on the machine; a bracket mounted on the carriage; means for locking the bracket at any desired point; a slide bar mounted on the outer end of the bracket; means for raising and lowering the bracket; means for simultaneously shifting the slide bar transversely with respect to the mandrel; and means for moving the reproducer into or out of operative contact with the record. 105 110
6. An adjustable reproducer arm for talking machines comprising a carriage mounted on the machine; a bracket mounted on the carriage; means for locking the bracket at any desired point; a slide bar pivotally mounted on the outer end of the bracket; a reproducer holder on the end of the slide bar; a first lever fulcrumed on the bracket, one end of which is pivoted to the slide bar; a link connecting the other end of the lever and the carriage whereby the slide bar is moved transversely with respect to the machine mandrel on the upward or downward movement of the bracket; a finger piece on the carriage; a second lever fulcrumed on the first lever; a link connecting the finger piece and second lever; a yoke mounted on the slide bar; and a link connecting the yoke and second lever whereby the yoke is oscillated on a movement of the finger piece. 115 120 125
7. An adjustable reproducer arm for talking machines comprising a carriage mounted on the machine; a bracket mounted on the carriage; means for locking the bracket at any desired point; a slide bar mounted on the outer end of the bracket; a reproducer holder on the end of the slide bar; means for raising or lowering the bracket; means for simultaneously shifting the slide bar transversely with respect to the machine mandrel; means for moving the reproducer into or out of operative contact with the record; and means for propelling the arm across the record. 130 135
8. An adjustable reproducer arm for talking machines comprising a carriage mounted on the machine; a bracket mounted on the carriage; a slide bar pivotally mounted on the outer end of the bracket; a reproducer holder on the end of the slide bar; a first lever fulcrumed to the bracket, one end of which is pivoted to the slide bar; a link connecting the other end of the lever and the carriage whereby the slide bar is shifted transversely with respect to the 140 145

mandrel on the upward or downward movement of the bracket; a finger piece on the carriage; a second lever fulcrumed on the first lever; a link connecting the finger piece and second lever; a yoke mounted on the slide bar; a link
 5 connecting the yoke and second lever whereby the yoke is oscillated on a movement of the finger piece; a bell crank provided with a knife edge pivoted to the carriage and adapted to engage the machine feed screw; means for holding the knife edge in yielding contact with the screw; and
 10 a projection on the finger piece adapted to move the knife edge out of engagement with the feed screw.

9. In a talking machine an adjustable reproducer support comprising a carriage mounted on the machine; a bracket mounted on the carriage; a slide bar mounted on the outer end of the bracket; a reproducer holder on the end of the slide bar a lever fulcrumed to the bracket, one end of which is pivoted to the slide bar; a link connecting the other end of the lever and the carriage whereby the slide bar is moved transversely with respect to the mandrel
 20 on the upward or downward movement of the bracket; a finger piece mounted on the carriage a yoke pivotally mounted on the outer end of the slide bar; and a lever system of variable throw connecting said finger piece and yoke whereby the latter is oscillated by the movement of the finger piece irrespective of the position of the bracket.
 25

10. An adjustable reproducer support for talking machines comprising a carriage mounted on the machine; a bracket mounted on the carriage; a slide bar pivotally mounted on the outer end of the bracket; elastic fingers
 30 on the end of the slide bar; means for raising or lowering the bracket; and means for simultaneously shifting the slide bar transversely with respect to the mandrel.

11. An adjustable reproducer arm for talking machines comprising a carriage mounted on the machine; a bracket mounted on the carriage; a slide bar mounted on the outer end of the bracket; a reproducer holder on the end of the slide bar; stops on the slide bar for limiting the transverse movement; means for raising and lowering the bracket; and means for simultaneously shifting the slide bar with respect to the machine mandrel. 40

12. In a talking machine the combination of a slide rod mounted on the machine; a feed screw revolubly mounted on the machine parallel to the rod; a split tube surrounding the feed screw, an adjustable reproducer arm slidably mounted on said slide rod and split tube; and means carried by the arm adapted to engage the feed screw to propel the carrier across the record. 45

13. In a talking machine the combination of a slide rod mounted on the machine; a feed screw revolubly mounted on the machine parallel thereto; a split tube surrounding the feed screw; a reproducer arm slidably mounted on said slide rod and tube; a bell crank provided with a knife edge mounted on the arm; means for normally holding the knife edge in contact with the screw; and means for disengaging the knife edge therefrom. 50

In testimony whereof I have hereunto subscribed my name in the presence of two witnesses. 55

WALTER C. RUNGE.

Witnesses:

ROBT. B. KILLGORE,
 CONRAD DIEHL.

W. C. RUNGE.
ADJUSTABLE REPRODUCER ARM FOR TALKING MACHINES.

APPLICATION FILED AUG. 18, 1906.

3 SHEETS—SHEET 1.

FIG. 1

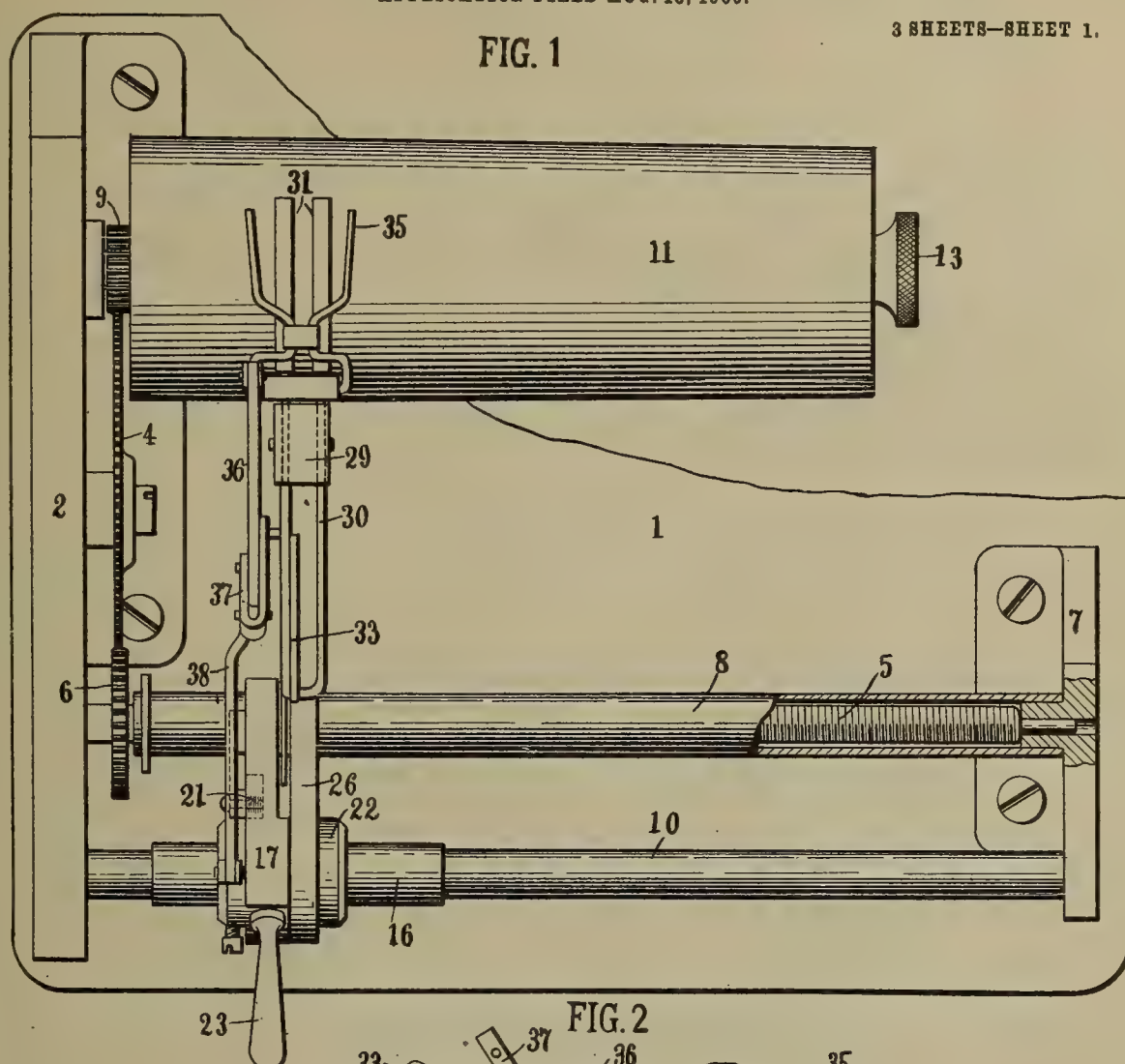
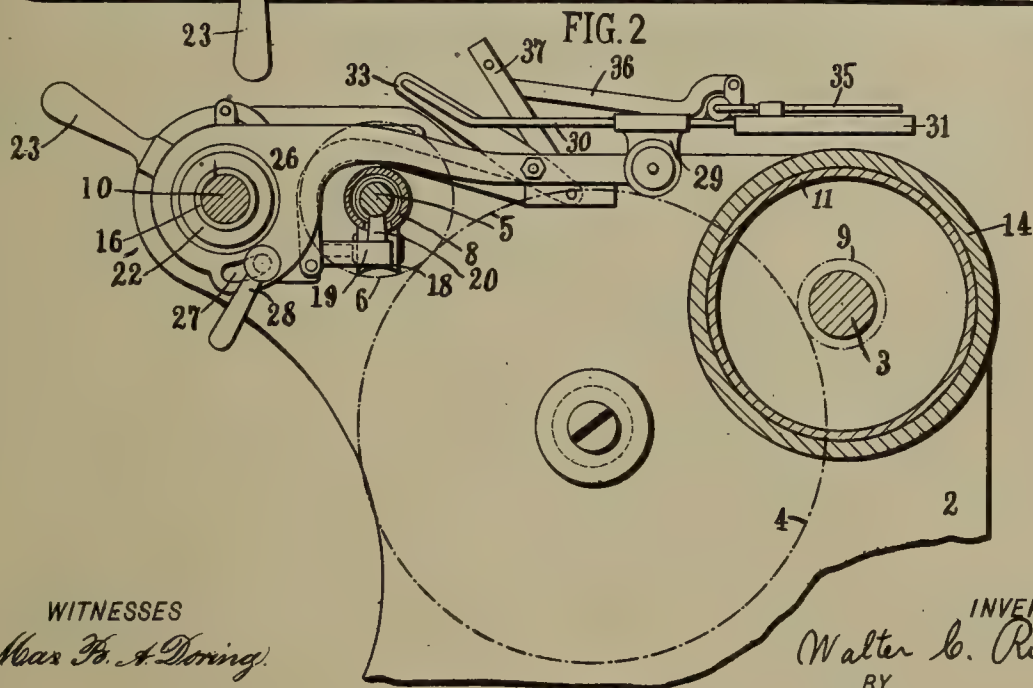


FIG. 2



WITNESSES

Max F. A. Doring

Conrad Liehl

INVENTOR

Walter C. Runge,

BY

Robert B. Hillger

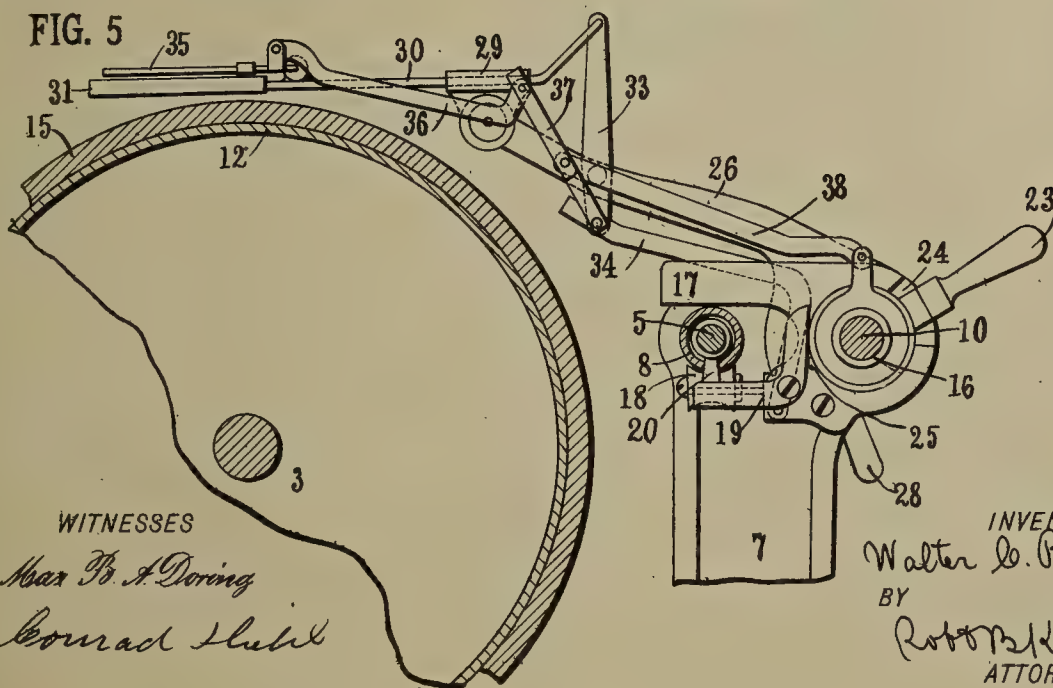
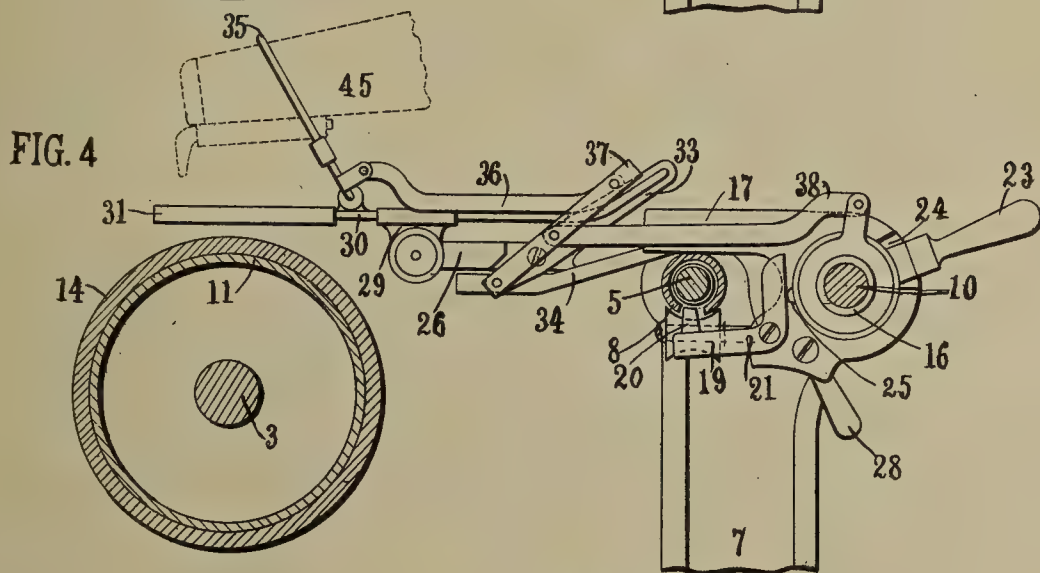
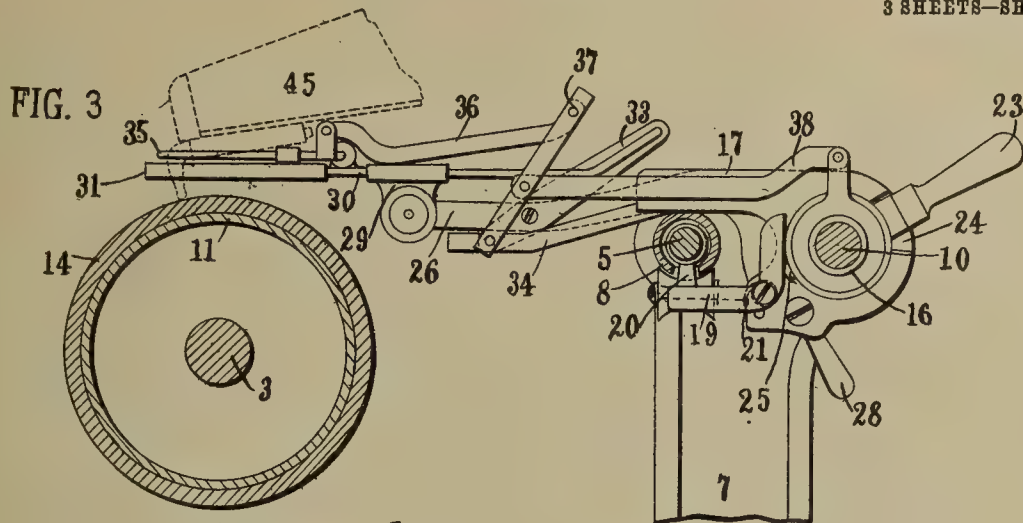
ATTORNEY

W. C. RUNGE.

ADJUSTABLE REPRODUCER ARM FOR TALKING MACHINES.

APPLICATION FILED AUG. 18, 1906.

3 SHEETS—SHEET 2.



W. C. RUNGE.

ADJUSTABLE REPRODUCER ARM FOR TALKING MACHINES.

APPLICATION FILED AUG. 18, 1906.

3 SHEETS—SHEET 3.

FIG. 6

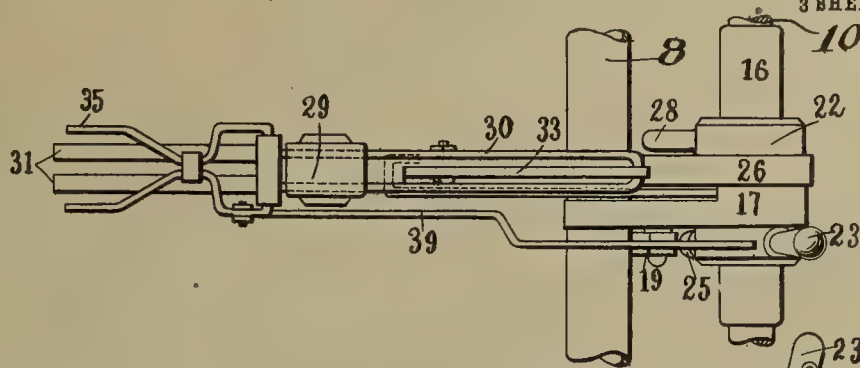


FIG. 7

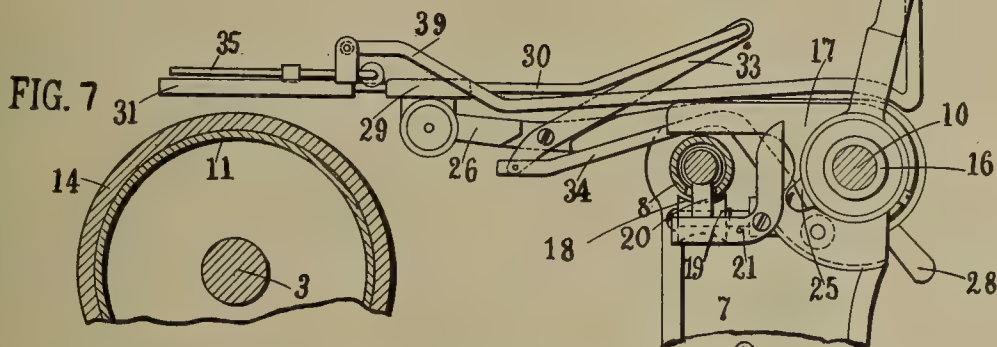


FIG. 8

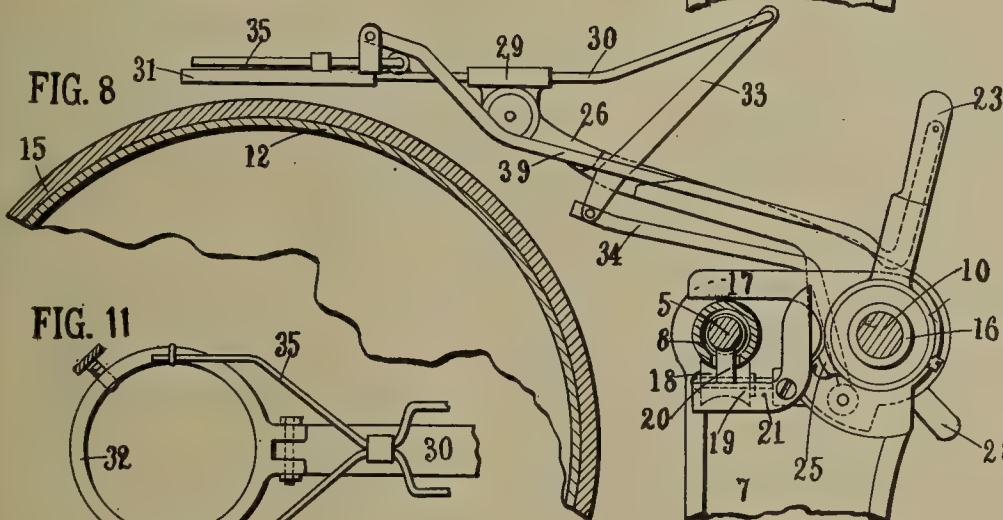


FIG. 11

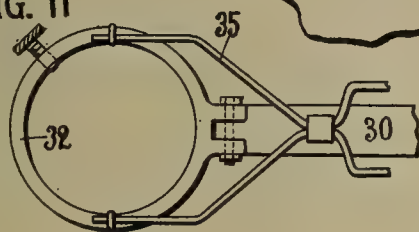


FIG. 9

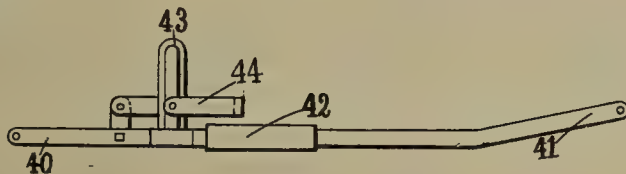
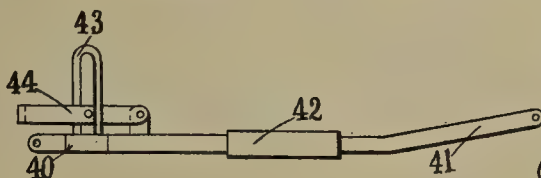


FIG. 10



WITNESSES

Max F. A. Doring
Conrad F. Lüh

INVENTOR

Walter C. Runge,
BY
Robert Killgore,
ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN F. MURRAY, OF LINDSEY, OHIO.

GRAPHOPHONE SOUND-BOX.

No. 860,604.

Specification of Letters Patent.

Patented July 16, 1907.

Application filed February 15, 1904, Serial No. 193,604. Renewed June 24, 1907. Serial No. 380,645.

To all whom it may concern:

Be it known that I, JOHN F. MURRAY, a citizen of the United States, residing at Lindsey, in the county of Sandusky and the State of Ohio, have invented a new and useful Improvement in Graphophone Sound-Boxes, of which the following is a specification.

My invention relates to a reproducer or sound box having a peculiar shape, and having a double armed stylus lever, and needle adapted for use with the hard disk records.

The object of the invention is to obtain a clear, distinct and natural tone.

My invention consists of the novel features of construction and combination of parts hereinafter shown and described, particularly pointed out in the claim, and shown in the accompanying drawings, in which,

Figure 1 is a perspective view of my improved attachment. Fig. 2 is a plan view. Fig. 3 is a side elevation. Fig. 4 is a vertical or longitudinal section.

In constructing my improvement I employ a metal reproducer or sound box A having a mica diaphragm B and the stylus lever C. An interior annular shoulder is formed in the sound box which is cylindrical in form and this shoulder supports the mica disk B between two rubber packing rings B', which are held in place by a split ring B². I am aware that this construction of diaphragm is old and do not claim same. The periphery or rim of the reproducer is cut away as shown at A' on one side and in this cut out portion is arranged a metal block C' from the upper inner edge of which extends the stylus lever C. This block has a depending portion C² vertically slotted and through the slot works a set screw C³ by means of which the block is held to the rim of the sound box A, and the slot permits the adjustment of the block vertically, with respect to the sound box thereby regulating the pressure with which the arms of the stylus lever bears on the diaphragm B. The stylus lever may be integral with or welded to the block, or otherwise secured and consists of laterally extending arms projecting to each side of the block and at right angles to same, as shown at C⁴, the arms are then bent forward as shown at C⁵, and have a reduced portion C⁶ which is curved downward to the diaphragm. the lower ends of the curved portions being formed with circular shoes bent parallel to the diaphragm and se-

cured to same by means of a small amount of wax. These shoes C⁷ rest on the diaphragm slightly to one side of the center of the diaphragm, the shoes being arranged on opposite sides of the center of the said diaphragm.

The sound box A consists of the cylindrical ring-like portion A² in which is held the diaphragm B, and this ring portion is connected to the cylindrical, tubular portion A⁴ by the truncated conical portion A³, this intermediate cone-shaped portion forming a reservoir into which the sound waves produced by the vibrations of the diaphragm are collected and from which they pass into the contracted or tubular portion A⁴. It will be noted from Fig. 2 that the distance between the shoes C⁷ is equal to the diameter of the tubular portion A⁴ less the diameter of the shoes. A socket is formed in the outer end of the block C' in which is placed the usual steel needle E held in place by a set screw E' in the usual manner.

It will be noted that while the arms of the stylus lever rest upon the diaphragm upon opposite sides of the center of the diaphragm and therefore contacts with it at two different points yet both points or shoes of the stylus lever are connected and integral with a common arm C⁴ arranged as previously stated at right angles to the block and both shoes receive uniform impulses and produce synchronous vibrations. The conical shaped reservoir C³ collects and passes these vibrations into the tubular portion and a stronger and more natural tone is produced than by the usual construction.

Having thus fully described my invention what I claim as new and desire to secure by Letters Patent is,

In a device of the kind described, the combination with a sound box provided with a cut out portion in the rim, of a block arranged in said cut out portion, a vertically forked depending portion extending from the bottom of said block, a set screw on the periphery of said rim for engaging the fork, a diaphragm within the sound box, a U-shaped arm extending from the block above said diaphragm, downwardly curved portions upon the ends of the U-shaped block, said curved portions terminating in flat shoes adapted to rest upon the diaphragm, for the purpose described.

JNO. F. MURRAY.

Witnesses:

C. G. BOWERS,
I. N. OVERMYER.

J. F. MURRAY.

GRAPHOPHONE SOUND BOX.

APPLICATION FILED FEB. 15, 1904. RENEWED JUNE 24, 1907.

Fig. 1.

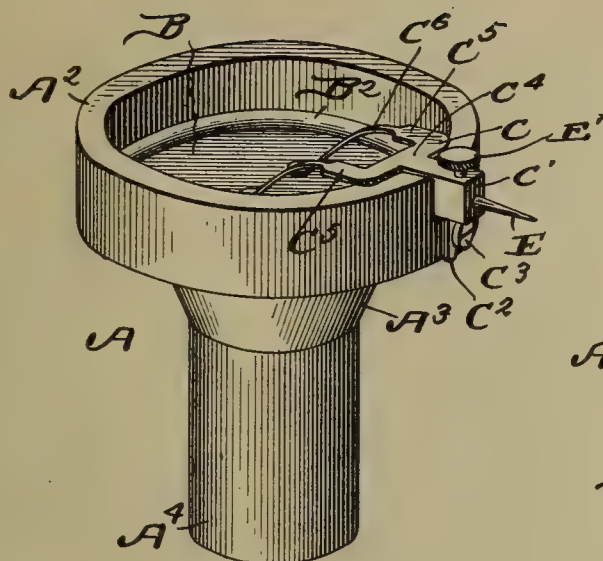


Fig. 2.

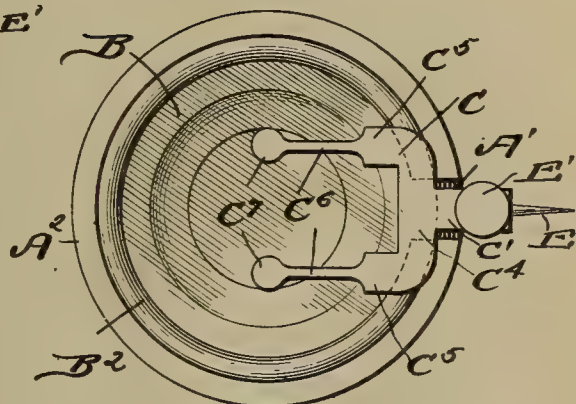


Fig. 3.

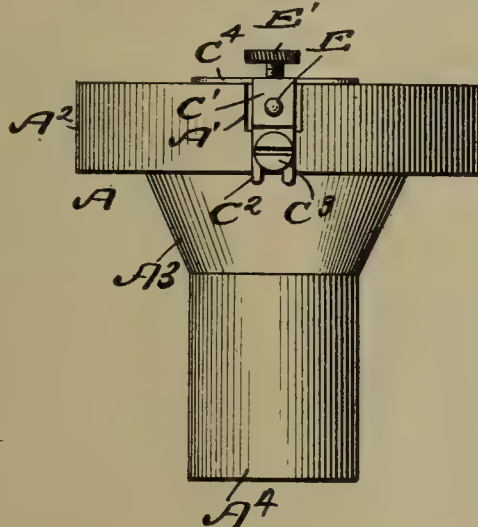
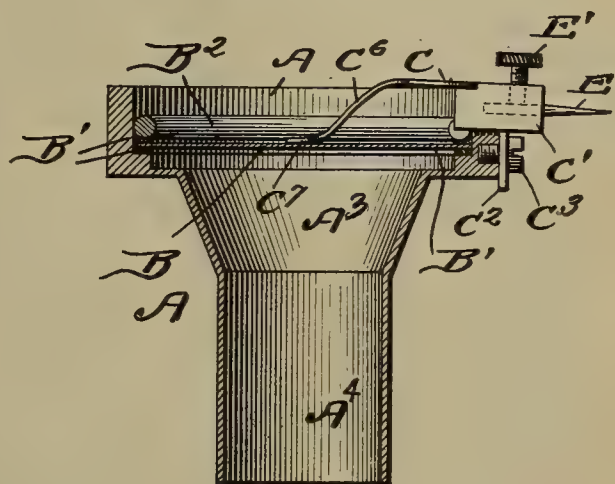


Fig. 4.



Inventor

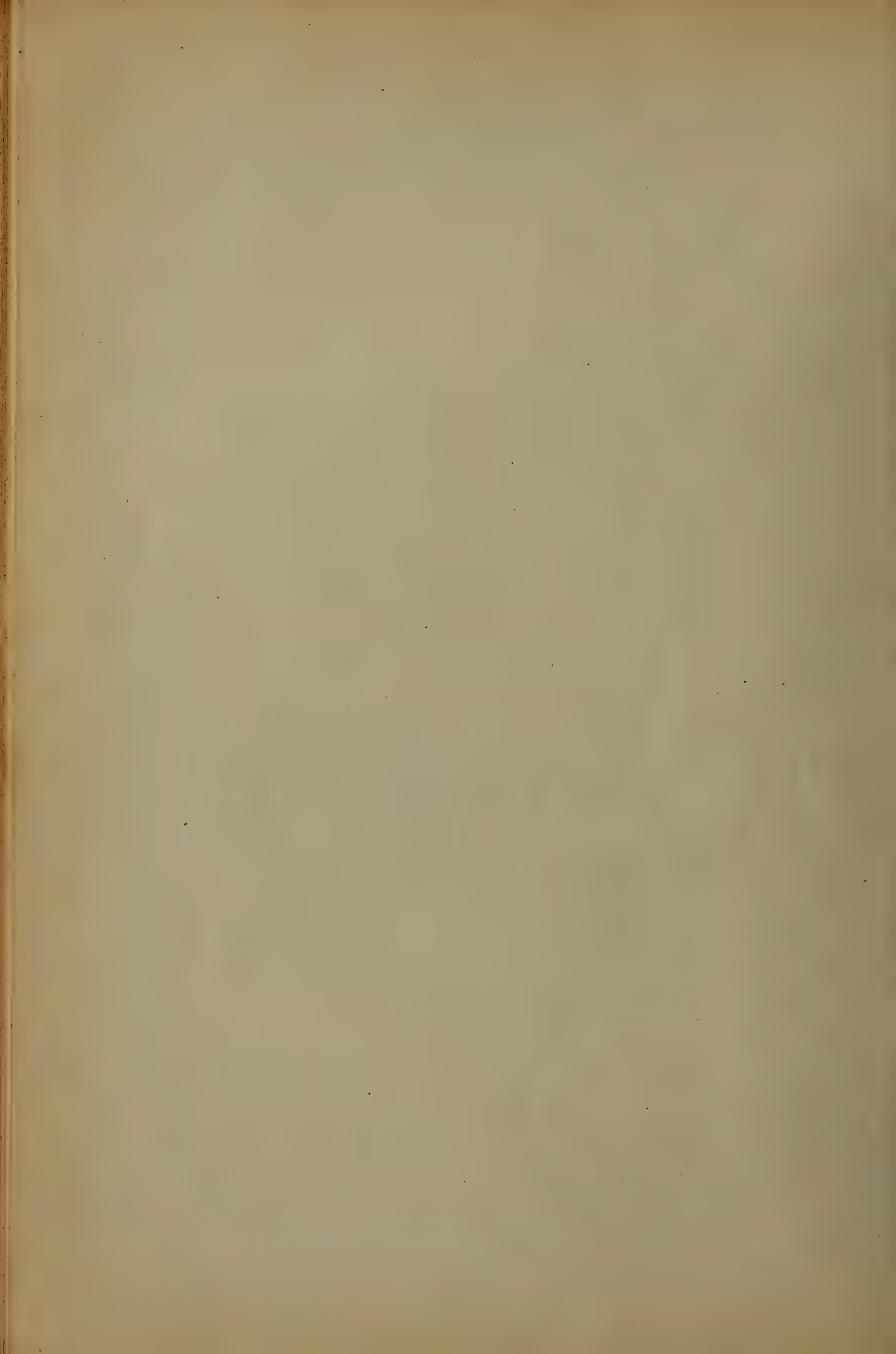
John F. Murray.

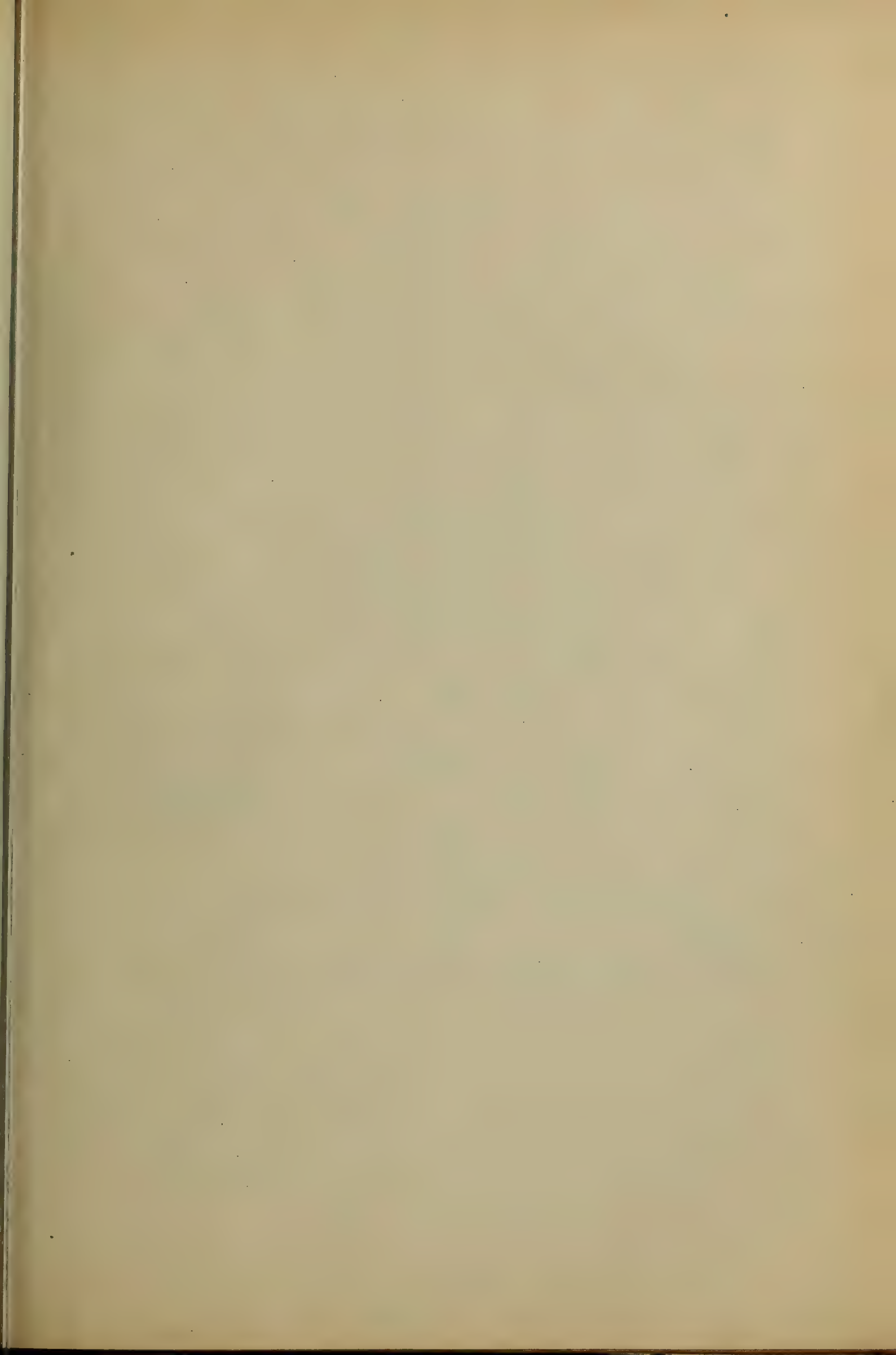
Witnesses

W. H. Blouet.
Clarence Shaw

By

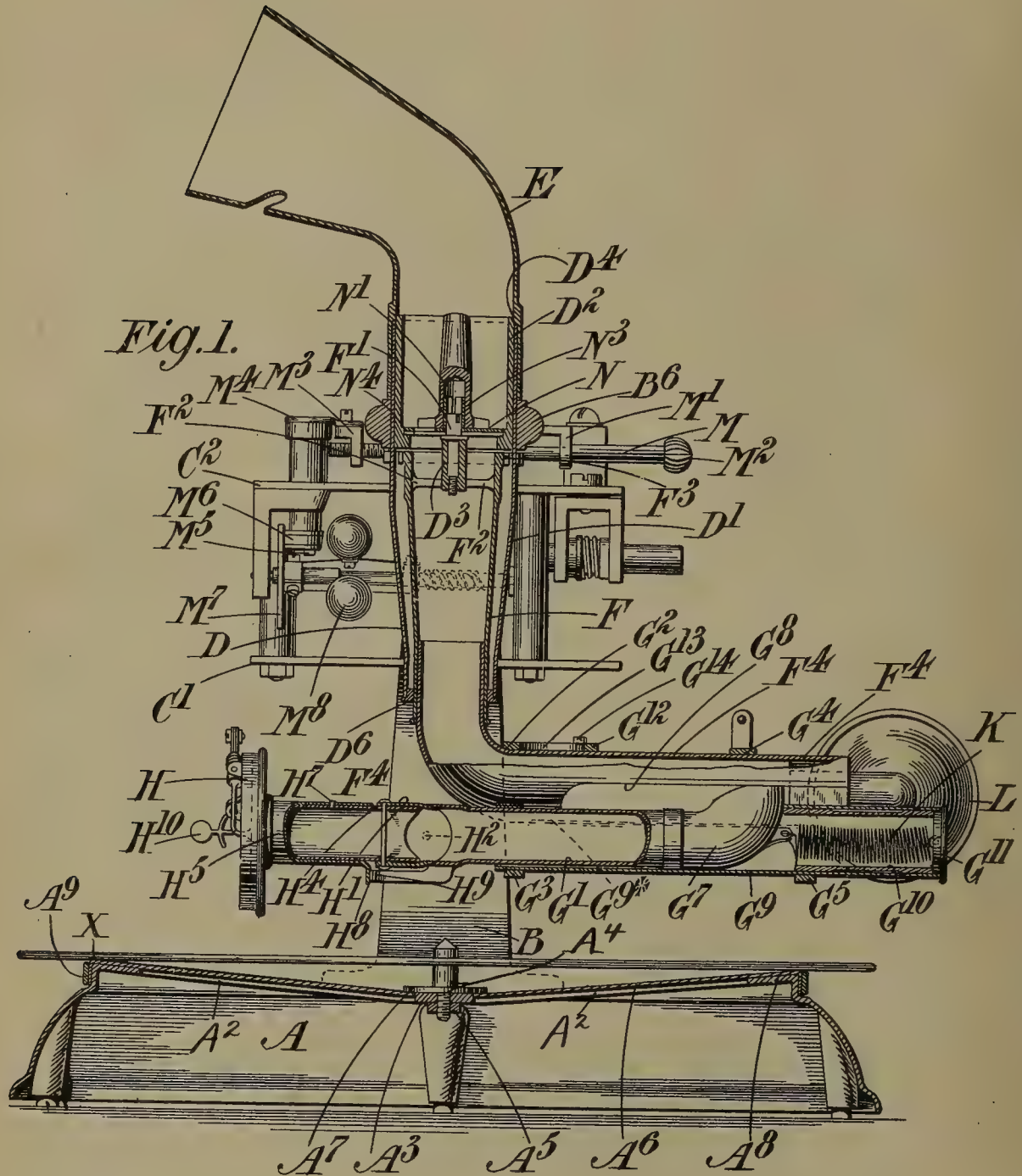
J. Murray & Brock
Attorneys





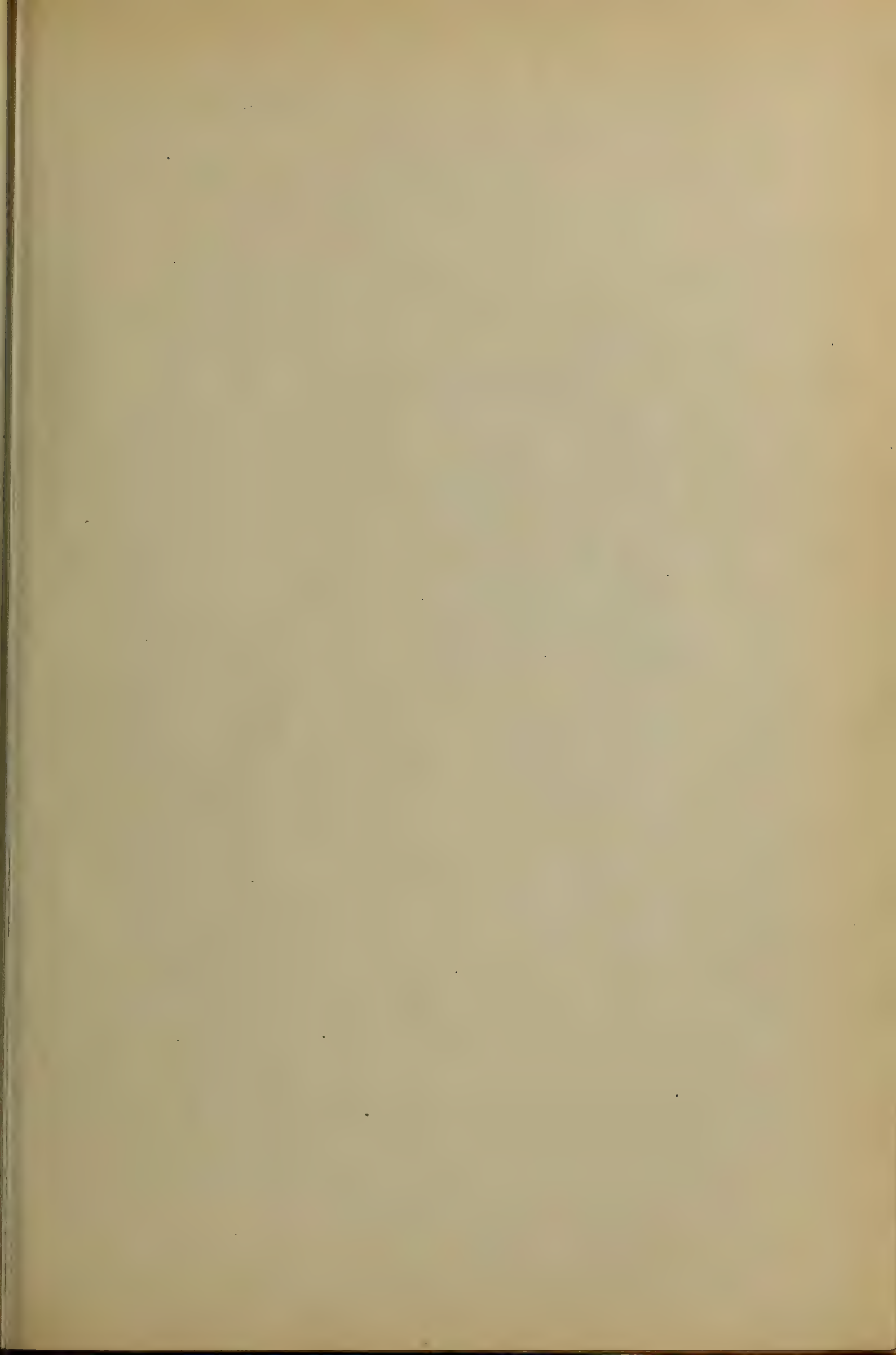
F. MYERS.
SOUND REPRODUCING MACHINE.
APPLICATION FILED MAY 3, 1906.

4 SHEETS—SHEET 1.



Witnesses:
W. H. Boulton
[Signature]

Inventor
Frederick Myers,
By W. H. Boulton
attorney

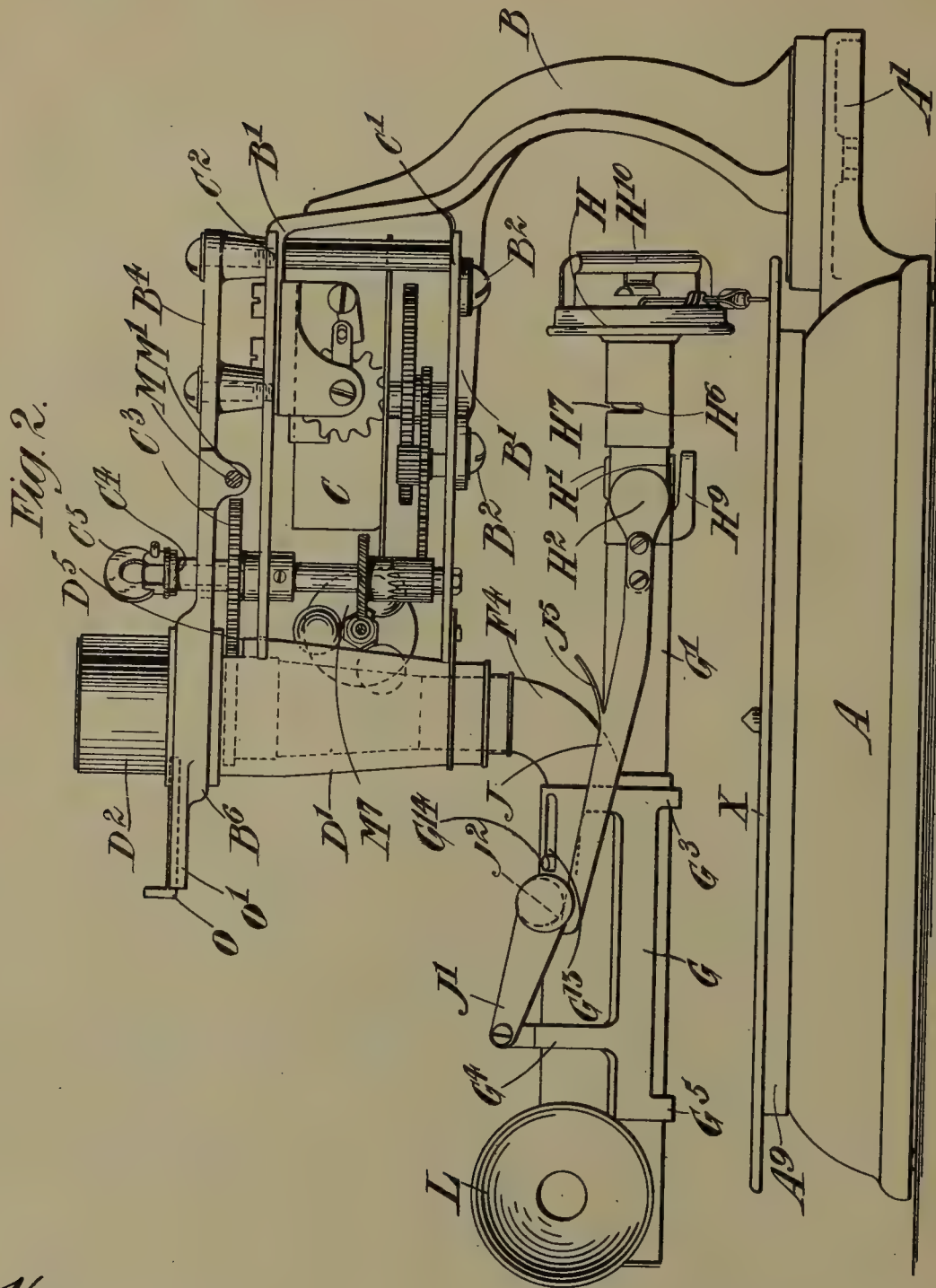


F. MYERS.

SOUND REPRODUCING MACHINE.

APPLICATION FILED MAY 3, 1906.

4 SHEETS—SHEET 2.



Witnesses:

W. K. Baile

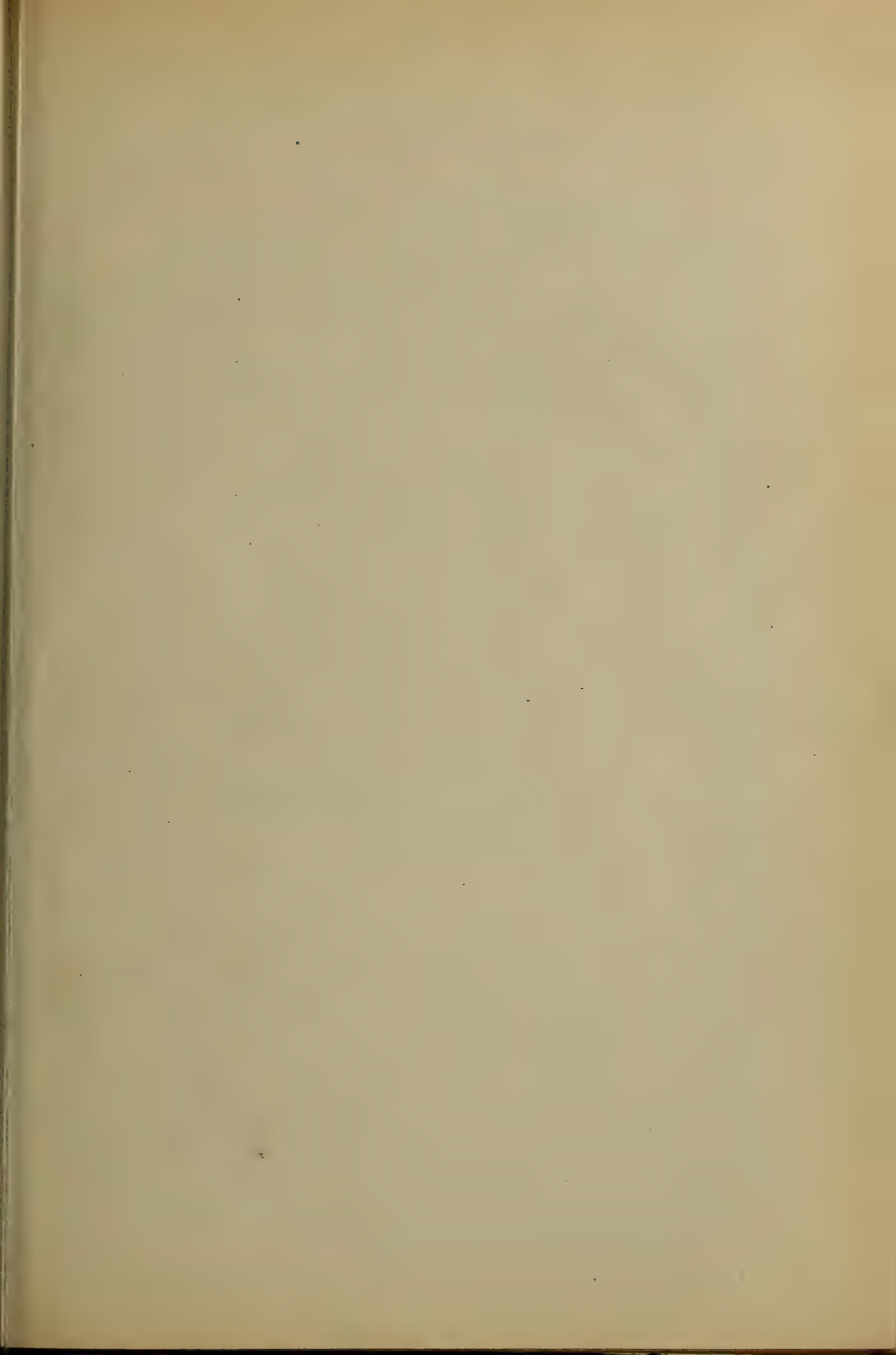
W. B. Carpenter

Inventor:

Frederick Myers,
By Wm E. Boulter.
Attorney

Wm E. Boulter.

Attorney



F. MYERS.
SOUND REPRODUCING MACHINE.
APPLICATION FILED MAY 3, 1906.

4 SHEETS—SHEET 3.

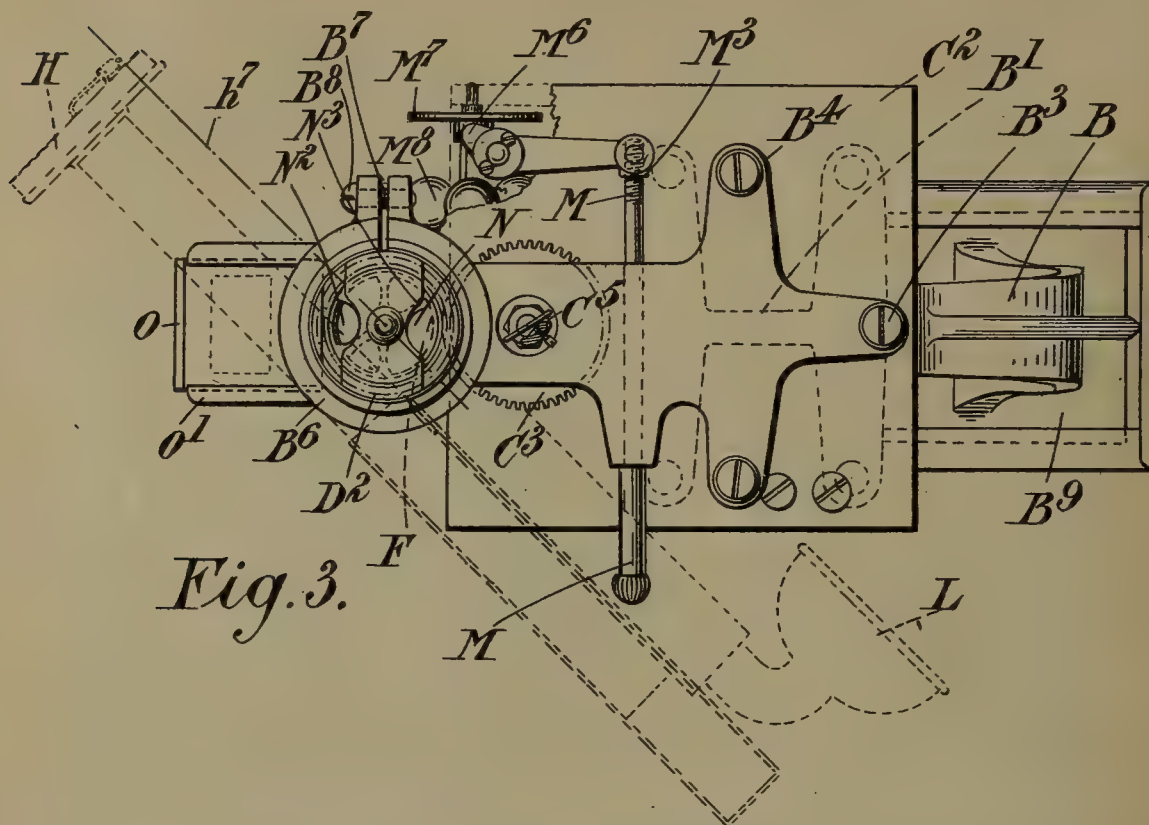


Fig. 3.

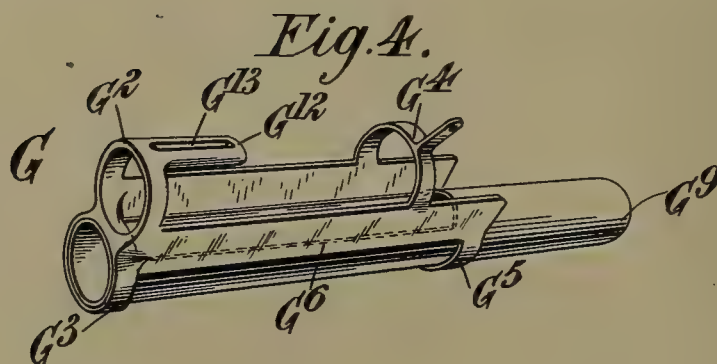


Fig. 4.

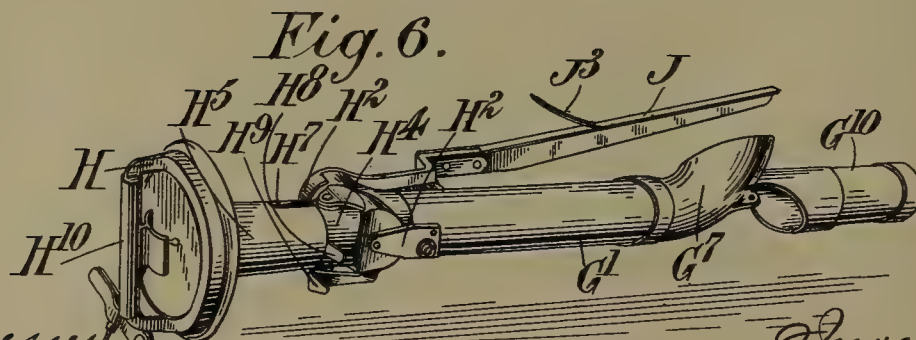


Fig. 6.

Witnesses
W. K. Boulter
[Signature]

Inventor
Frederick Myers,
By W. K. Boulter
Attorney

No. 860,878.

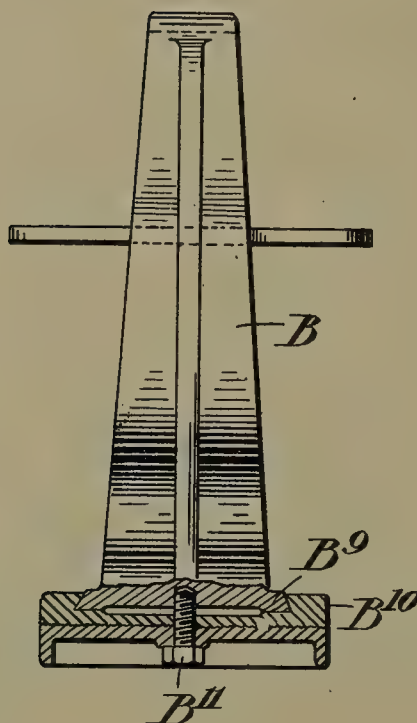
PATENTED JULY 23, 1907.

F. MYERS.
SOUND REPRODUCING MACHINE.

APPLICATION FILED MAY 3, 1906.

4 SHEETS—SHEET 4.

Fig. 5.



Witnesses:

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UNITED STATES PATENT OFFICE.

FREDERICK MYERS, OF LONDON, ENGLAND.

SOUND-REPRODUCING MACHINE.

No. 860,878.

Specification of Letters Patent.

Patented July 23, 1907.

Application filed May 3, 1906. Serial No. 315,060.

To all whom it may concern:

Be it known that I, FREDERICK MYERS, a citizen of the United States of America, residing at London, in England, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a specification.

This invention is for improvements in or relating to sound-reproducing machines and has particular reference to those in which disk records are employed.

10 According to this invention the record, instead of being carried upon a table rotated by the motor, as heretofore, is supported upon a stationary table, while the sound-box travels in a circular path over the face of the record. One advantage of a machine constructed in this manner is that it is found to operate efficiently even when tilted considerably out of the normal level, whereas machines having a rotating record are rendered irregular in action or even inoperative under similar conditions. It will be understood that any support employed to carry the record is comprised by the term "table" hereinafter employed throughout the specification. The sound-box is driven by the motor but is also free to move laterally in a straight line and preferably in a path strictly radial to the record for the purpose of following the spiral groove therein in the well known manner. In disk machines at present on the market, the sound-box is carried on a pivoted arm and therefore cannot move in a straight line whether such line be radial or otherwise, but traverses a path constituting an arc struck from the pivot of the arm.

25 A further feature of this invention consists in utilizing the movement of the sound-box to provide a forced draft through the intake of the trumpet whereby the volume of the sound is increased and the quality improved.

30 In the accompanying drawings which illustrate one method of carrying out this invention—Figure 1 is a central vertical section of the machine viewed from the front; Fig. 2 is a side elevation of the same viewed from the right of Fig. 1; Fig. 3 is a plan of the machine; Fig. 4 is a perspective view of a detail; Fig. 5 is a rear elevation of the supporting bracket, and Fig. 6 is a perspective view of the sound-box and adjacent parts.

35 Like letters indicate like parts throughout the drawings.

The base A of the machine shown is circular except for a rear lug A¹ carrying a bracket B. The upper surface of the base is dished and for the sake of lightness it is perforated so that radial arms A² only are left connected to a central boss A³. In this boss a centering pin A⁴ is secured by a nut A⁵ and the base is covered by a piece of baize A⁶ held at the center by a washer or flange A⁷ on the pin A⁴. The baize is large enough to extend over the edge A⁸ of the base and is there secured by a ring A⁹ which is forced over the upper end of the base and grips the baize so that it is pulled tight

and securely held in place. The upper face of the base serves as the record table and a record X is indicated in place thereon. It will thus be seen that the record table is stationary and consequently the record is stationary, so that the sound-box must be operated to travel or move in relation thereto.

The upper end of the bracket B has a jaw B¹ in which a motor C of any convenient construction is mounted. The motor is secured by screws B² which pass through lugs on the lower member of the jaw B¹ and enter the bottom plate C¹ of the motor. The upper plate C² of the motor is secured to the upper jaw member B¹ by a screw B³ which in addition to fastening the upper plate, helps to hold in place an arm B⁴. The arm has three feet B⁵ which serve as distance pieces whereby the arm is lifted above the plate. The screw B³ passes through one of these feet and other screws B^{3*} are passed through the other two feet into the plate C² so that the arm is rigidly held in place. The forward end of the arm extends beyond the motor and is shaped to constitute a socket B⁶, split as shown at B⁷, and provided with a gripping screw B⁸ whereby the ends of the socket may be contracted to tighten it upon a sleeve D carried therein. The lower end of the sleeve tapers off in the form of a truncated cone, as shown at D¹, but the upper end is of uniform diameter.

75 Within the upper end of the sleeve a liner D² is mounted having a web D³ at its base. The upper end of the liner has a lip D⁴ adapted to engage a corresponding groove in the wall of the sleeve D. The lip projects slightly from the surface of the liner D² so that the upper end of the sleeve D springs out slightly as the liner is forced into place, until the lip comes opposite the groove in the sleeve, where it is securely held. A conical elbow-socket E takes over the upper end of the sleeve D and receives the trumpet commonly employed with these instruments.

85 Within the lower end of the sleeve D, a vertically rotatable tube F is mounted which constitutes the intake of the trumpet. Its upper end is open to the interior of the liner D², and thus the trumpet socket E, and its lower end communicates with the sound-box as hereinafter described. The intake F is suspended from the web D³ in the liner D² by a screw F¹. The screw is shouldered to rest upon the web and extends through the same and into a web F² in the upper end of the intake F. A toothed ring F³ surrounds the upper end of the intake and is rigidly secured thereto and gears with a toothed wheel C³ on the motor; the sleeve D is slotted as shown at D⁵, to admit the wheel C³. The lower end of the intake F extends beyond the sleeve D and receives a tubular elbow F⁴. This elbow constitutes a horizontal supporting arm for a sliding arm G¹. The sliding arm is carried on the elbow by a fitting G, shown in perspective in Fig. 4. This fitting is preferably cast and for convenience may

be described as comprising two double sockets G^2 , G^3 and G^4 , G^5 , respectively connected together by side plates G^6 . The sockets G^2 , G^4 , take over the horizontal portion of the elbow F^4 and the sockets G^3 , G^5 , have secured in them a tube G^9 which receives and serves as a guide for the sliding arm G^1 . The arm G^1 carries on that end within the tube an elbow G^7 , the mouth of which enters a slot G^8 in the horizontal limb of the elbow F^4 ; the slot extends along the limb a distance equal to the travel of the sliding arm G^1 . The sliding arm has an extension G^{10} beyond the elbow G^7 , such portion constituting a steadying piece for the arm when the latter is advanced so that the elbow approaches near the end of the tube G^9 . The tube G^9 is slotted, as shown at G^* , to allow free movement of the elbow G^7 as it traverses the slot G^8 .

On the free end of the arm G^1 the sound-box H is carried. This may be of any convenient construction and therefore does not require detailed description in this specification. It is not carried directly on the arm G^1 , but is supported from the same by a connection of the Cardan joint type. This connection comprises a horizontal jaw-piece H^2 carried on the end of the arm G^1 . In the jaw H^2 a vertical jaw-piece H^1 is pivoted, and within this jaw-piece is carried a tube H^4 adapted to receive the corresponding tubular socket H^5 of the sound-box. It will be seen that this joint permits free movement of the sound-box as it traverses the groove of the record and allows it to rest upon the record.

The operation of this machine is as follows:—The motor imparts motion to the wheel C^3 which in turn rotates the vertical intake tube F by means of its engagement with the toothed ring F^3 thereon. The end of the intake rotates freely in the cover D^6 of the sleeve D and carries round with it the elbow F^4 . The fitting G and sliding arm G^1 move with the elbow and consequently the sound-box secured to the free end of the arm G^1 will, if left to itself, travel in a circular path. As is well known in these machines, the groove in the record is spiral and consequently the point of the sound-box needle must, as it traverses the groove, move laterally towards the center of the record; this movement is permitted by the sliding arm G^1 and is in a strictly radial direction, as indicated by the line h^7 , Fig. 3. It will be noted that the arm G^1 slides in a path parallel to a radial line drawn from the center of rotation, but its position is so adjusted that the needle point traverses the desired radial path. In machines in which the sound-box is carried on a swinging arm, this strictly radial movement, or any straight line lateral movement, is impossible, and it is found in practice that the records become injured by the movement of the needle in a curved instead of a radial path.

A further feature of this invention relates to means whereby the sliding arm is controlled in its endwise movement, as apart from some such control, the centrifugal action is found to be sufficient to throw the sound-box out of the groove in the record. The controlling means comprise a cam device whereby a yielding member is displaced as the arm G^1 is extended further from the fitting G , whereby the resistance to outward movement of the arm may be made proportionate to the degree of centrifugal action, whatever position the arm may occupy. This arrangement is shown clearly in Fig. 2. A cam J is secured to the arm G^1 at a point which

lies beyond the tube G^9 even when the arm is in the withdrawn or central position and on the socket G^4 of the fitting is pivoted a weighted arm J^1 carrying a roller J^2 . The roller J^2 lies in the path of the cam J and as the arm G^1 is drawn outward away from the central position, the roller rides up the cam. It will be seen that the incline of the cam may be made such as to provide the desired resistance for the purpose of counteracting the centrifugal effect. Preferably the control of the arm G^1 is further effected by a spiral spring K mounted within the extension G^{10} of the arm. One end of the spiral spring is secured to the elbow G^7 and the other end to a cap G^{11} by which the end of the tube G^9 is closed. Preferably the spring K is slack when the arm G^1 is at the central position as when the arm nears this position it is found that it has a tendency to run suddenly in towards the center so that the needle of the sound-box leaves the groove of the record. To further insure that this sudden sliding-in of the arm shall not take place, a second cam J^3 may be mounted on the arm G^1 . This cam inclines in a direction opposite to that of the cam J and also lies in the path of the roller J^2 , so that the one weighted arm coöperates with both cams, but the cam J resists outward movement of the arm G^1 , while the cam J^3 resists inward movement of the same after the arm has passed a given point. It will be noted that in the drawings the cam J is shown as having a constant incline throughout its length so that it does not offer increasing resistance as the arm is moved farther outwards. This is because the spring is employed with it and the resistance of the spring increases as it is further extended but if desired the cam may have an increasingly steep incline as shown by the cam J^3 .

Another feature of this invention consists in the utilization of the movement of the sound-box to create a forced draft through the trumpet whereby the volume of sound may be increased. For this purpose a mouth-piece or funnel L is mounted in the free end of the elbow F^4 . The mouth of the funnel faces in the direction of rotation so that as the sound-box travels, air will be forced through the funnel and along the elbow F^4 up through the intake F and socket E , whence it passes out through the trumpet.

The sound box H is preferably rotatable upon the part H^4 of the Cardan joint, and its socket H^5 is slotted as shown at H^6 to engage the pin H^7 on the part H^4 . The slot H^6 is in the form of a bayonet-joint and allows limited rotation of the sound box, whereby the latter may be brought into either of the positions indicated. The working position is shown in Fig. 2, but when it is desired to insert a needle, the sound box may be turned into the position shown in Fig. 1, so that the needle-holder is raised. On the socket H^5 of the sound-box is a lug or engaging piece H^8 and a coöperating stop H^9 is carried on the part H^4 of the Cardan joint, but extends forward to the lug H^8 . These parts are so disposed that when the sound box is in the position shown in Fig. 1, the lug H^8 bears against the stop H^9 whereby the downward movement of the sound-box about the horizontal pivot of the Cardan joint is limited. This gives rigidity to the sound-box when the needle holder is in the raised position and renders it easier to handle. Conveniently a cross-bar or finger-piece H^{10} is secured across the face of the sound-box, and serves both to

protect the diaphragm and as a grip whereby the sound-box may be turned.

In order that the same machine may take both large and small records, the fitting G is made adjustable upon the horizontal portion of the elbow F⁴. On the socket G² is a lug G¹² slotted as shown at G¹³, and a pin G¹⁴ fast in the elbow F⁴ engages this slot. When the fitting is advanced to the limit of its movement in a direction towards the center of the machine, the apparatus is in position for taking large records, but when drawn back to the limit of its movement in the opposite direction as controlled by the slot G¹³ and pin G¹⁴, the arm G' is in the position for small records, as will be readily understood.

The wheel C³ of the motor and toothed ring F³ on the top of the intake F are preferably of fiber or some other material which is noiseless in operation. As such substances are not as strong as metal, it is probable that the teeth would be broken should the arm G' be suddenly stopped during its rotation without the motor being braked. For this purpose the wheel C³ is not carried fast upon its spindle, but is held friction-tight between a shoulder C⁴ thereon and a nut C⁵. The nut may be slacked or tightened as desired for the purpose of increasing or decreasing the degree of friction between the wheel and its driving spindle.

For controlling the motor a rod M is slidingly supported in a lug M' on the arm B⁴. One end of the rod is provided with a head M² whereby it may be handled and the other end is screw-threaded and engages a pivoted lug M³ carried by a horizontal arm M⁴. The arm M⁴ is supported on one end of a vertical rock shaft M⁵ and at the lower end of this rock shaft is an eccentric brake-piece M⁶. The brake-piece is in proximity to a brake disk M⁷ forming part of the well known governor device indicated at M⁸. For starting the motor the rod M is pushed inwards, so that the brake-piece M⁶ is withdrawn from the disk M⁷ and for stopping the motor the rod is moved in the reverse direction. In addition to starting and stopping, however, the speed at which the motor runs may be controlled by rotating the rod M whereby it is screwed further in to or out from the pivoted lug M³. It will be seen that if when thus rotated the rod is kept home at its starting position, the arm M⁴ will still be turned about its vertical pivot so that the brake-piece M⁶ will be brought nearer to or further from the disk M⁷, whereby the governor will be checked in the well known manner.

A tremolo device may be used with this machine and comprises a disk N having a central socket N' adapted to take over the head of the screw F' whereby the intake F is supported. The disk N practically closes the top of the intake but it has a notch or orifice N² at one side. Over the disk fits a bridge-piece N³, but this does not come in contact with the disk and rests at its outer edges upon a ledge N⁴ formed in the interior of the liner D². The bridge-piece is thus stationary, whereas the disk N rotates with the screw F' so that the orifice N² appears first at one side of the bridge piece and then at the other, whereby the tremolo effect is obtained.

The volume of sound passing to the trumpet may be controlled by a sliding shutter O carried in guides O' conveniently formed in one with the socket B⁶. The shutter can be advanced a greater or less distance across

the liner D², whereby any degree of modulation may be obtained, as will be readily understood.

The bracket B is adjustably carried upon the lug A' of the base A. For this purpose the foot of the bracket is beveled as shown at B⁹, and these beveled portions take into a correspondingly undercut groove in a shoe B¹⁰, which rests upon the surface of the lug. The bracket is held in place by a screw B¹¹ extending through the lug A¹ and shoe B¹⁰ into the bracket, and the lug is slotted so that the bracket may be adjusted before the screw is finally tightened. Thus by sliding the bracket in the shoe B¹⁰ and rotating the shoe on the lug the center of the socket B⁶ can be readily brought into alinement with the center of the record table, and then the screw B¹¹ tightened so that it is rigidly secured in place. The under side of the shoe B¹⁰ and the upper surface of the lug are preferably roughened to provide a grip between these two parts.

1. In a sound-reproducing machine the combination of a stationary "record-table," a sound-box, means for carrying the sound-box round in a circular path above the "record-table" and in a plane approximately parallel thereto, means for permitting lateral movement of the sound-box, a trumpet, and a tubular connection between the sound-box and the intake of the trumpet the movable part connected with the sound box having an air inlet whereby a forced draft is set up through the intake of the trumpet as the sound-box travels, substantially as set forth.

2. In a sound-reproducing machine the combination of a stationary "record-table," a sound-box, means for carrying the sound-box round in a circular path above the "record-table" and in a plane approximately parallel thereto, means for permitting lateral movement of the sound-box, a stationary trumpet, a swiveled tubular connection between the sound-box and the intake of the trumpet, and a flared mouthpiece or funnel carried by the movable part of the tubular connection and connected with the interior of such connection and facing in the direction of movement whereby a forced draft is set up through the intake of the trumpet as the sound-box travels, substantially as set forth.

3. In a sound-reproducing machine the combination of a stationary "record-table," a sound-box, an arm horizontal to and above the table and carrying the sound-box, means for rotating the arm about a vertical axis, and means for supporting the arm while permitting endwise movement of the same, substantially as set forth.

4. In a sound-reproducing machine the combination of a stationary "record-table," a sound-box, an arm horizontal to and above the table and carrying the sound-box, means for rotating the arm about a vertical axis, means for supporting the arm while permitting endwise movement of the same, and means for counterbalancing centrifugal action upon the sliding arm.

5. In a sound-reproducing machine the combination of a stationary "record-table," a bracket secured thereto and extending over the same, a tubular arm horizontal to the table and having a vertical extension whereby it is rotatably carried in the bracket, a second tubular arm parallel to the first such arm being slidingly supported by the first mentioned arm and communicating with the interior of the same, means for preventing rotation of this second arm about its longitudinal axis, a sound-box carried by the second arm in such manner that the vibrations of the diaphragm are imparted to the air in the second tubular arm and thence to that in the first tubular arm, and means for rotating the latter arm about a vertical axis concentric with the vertical portion of the same, substantially as set forth.

6. In a sound-reproducing machine the combination of a stationary "record-table," a bracket secured thereto and extending over the same, a tubular arm horizontal to the table and having a vertical extension whereby it is rotatably carried in the bracket, a fitting having two parallel sockets one of which takes over the horizontal portion of

this arm whereby the fitting is carried thereon, a second tubular arm slidably mounted in the second socket of the fitting and communicating with the interior of the first arm, means for preventing rotation of this second arm in its socket, a sound-box carried by the second arm in such manner that the vibrations of the diaphragm are imparted to the air in the second tubular arm and thence to that in the first tubular arm, and means for rotating the latter arm about a vertical axis concentric with the vertical portion of the same, substantially as set forth.

7. In a sound-reproducing machine the combination of a stationary "record-table," a bracket secured thereto and extending over the same, a tubular arm horizontal to the table and having a vertical extension whereby it is rotatably carried in the bracket, a fitting having two parallel sockets one of which takes over the horizontal portion of this arm whereby the fitting is carried and can be moved endwise thereon, a second tubular arm slidably mounted in the second socket of the fitting and communicating with the interior of the first arm, means for preventing the rotation of this second arm in its socket, a sound-box carried by the second arm in such manner that the vibrations of the diaphragm are imparted to the air in the second tubular arm and thence to that in the first tubular arm, and means for rotating the latter arm about a vertical axis concentric with the vertical portion of the same, substantially as set forth.

8. In a sound-reproducing machine the combination of a stationary "record-table," a bracket secured thereto and extending over the same, a tubular arm horizontal to the table and having a vertical extension whereby it is rotatably carried in the bracket, a fitting having two parallel sockets one of which takes over the horizontal portion of this arm whereby the fitting is carried and can be moved endwise thereon, a stop to limit such endwise movement, a second tubular arm slidably mounted in the second socket of the fitting and communicating with the interior of the first arm, means for preventing rotation of this second arm in its socket, a sound-box carried by the second arm in such manner that the vibrations of the diaphragm are imparted to the air in the second tubular arm and thence to that in the first tubular arm and means for rotating the latter arm about a vertical axis concentric with the vertical portion of the same, substantially as set forth.

9. In a sound-reproducing machine the combination of a stationary "record-table," a bracket secured thereto and extending over the same, a sleeve secured to the bracket in a position vertical to the table, an inner vertical tube rotatably mounted within the sleeve and extending below the same where it has a horizontal tubular extension or arm, a sound-box carried by this extension, means for rotating the inner tube, and means for permitting lateral movement of the sound-box, substantially as set forth.

10. In a sound-reproducing machine the combination of a stationary "record-table," a bracket secured thereto and extending over the same, a sleeve secured to the bracket in a position vertical to the table, an inner vertical tube rotatably mounted within the sleeve and extending below the same where it has a horizontal tubular extension or arm, a sound-box carried by this extension, means for rotating the inner tube, means for permitting lateral movement of the sound-box, and a trumpet carried on the upper end of the vertical sleeve, substantially as set forth.

11. In a sound-reproducing machine the combination of a stationary "record-table," a bracket secured thereto and extending over the same, a sleeve secured to the bracket in a position vertical to the table, a laterally projecting support within the sleeve, an inner vertical tube mounted within the sleeve and extending below the same where it has a horizontal tubular extension or arm, means for rotatably suspending this inner tube from the support within the sleeve, a sound-box carried by the extension or arm of the tube, means for rotating the inner tube and means for permitting lateral movement of the sound-box, substantially as set forth.

12. In a sound-reproducing machine the combination of a stationary "record-table," a bracket secured thereto and extending over the same, a sleeve secured to the bracket in a position vertical to the table, a laterally projecting support within the sleeve, an inner vertical tube mounted within the sleeve and extending below the same where it

has a horizontal tubular extension or arm, a lateral projection within the inner vertical tube and near the upper end of the same, means for suspending the inner vertical tube by its lateral projection from the support within the sleeve such suspending means being situated in line with the central vertical axis of the tube and permitting rotation of the tube about such axis, a guide on the lower end of the sleeve whereby the lower end of the inner tube is maintained in the vertical position, means for rotating the inner tube, a sound-box carried by the extension or arm of the inner tube, and means for permitting lateral movement of the sound-box, substantially as set forth.

13. In a sound-reproducing machine the combination of a stationary "record-table," a bracket secured thereto and extending over the same, a sleeve secured to the bracket in a position vertical to the table, a laterally projecting support within the sleeve, an inner vertical tube mounted within the sleeve and extending below the same where it has a horizontal tubular extension or arm, means for rotatably suspending this inner tube from the support within the sleeve, a disk carried detachably by the inner vertical tube and closing the same except for an orifice in the disk, a bridge-piece carried by the stationary sleeve and extending across the disk on the outlet side of the sleeve but in proximity to the disk, a sound-box carried by the extension or arm of the tube, means for rotating the inner tube, and means for permitting lateral movement of the sound-box substantially as set forth.

14. In a sound-reproducing machine the combination of a stationary "record-table," a sound-box, an arm horizontal to and above the table and carrying the sound-box, means for rotating the arm about a vertical axis, a support for the arm which permits endwise movement of the same therein, a cam carried by one of these last mentioned elements, namely the support and the sliding arm, and a yielding member opposed to the cam and carried by that element which does not carry the cam so that as the arm advances the yielding member resists such advance but is displaced by the cam.

15. In a sound-reproducing machine the combination of a stationary "record-table," a sound-box, an arm horizontal to and above the table and carrying the sound-box, means for rotating the arm about a vertical axis, a support for the arm which permits endwise movement of the same therein, a cam carried by one of these last mentioned elements, namely the support and the sliding arm, a yielding member opposed to the cam and carried by that element which does not carry the cam so that as the arm is advanced in a direction away from the center of rotation, the yielding member resists to such advance but is displaced by the cam, and a spring connecting the sliding arm with its support and also opposing outward movement of the arm, substantially as set forth.

16. In a sound-reproducing machine the combination of a stationary "record-table," a sound-box, an arm horizontal to and above the table and carrying the sound-box, means for rotating the arm about a vertical axis, a support for the arm which permits endwise movement of the same therein, a cam carried by one of these last mentioned elements, namely the support and the sliding arm, a yielding member opposed to the cam and carried by that element which does not carry the cam, so that as the arm moves towards the center of rotation the yielding member resists such movement but is displaced by the cam, and a spring connecting the arm and its support and tending to oppose outward movement of the arm, substantially as set forth.

17. In a sound-reproducing machine the combination of a stationary "record-table," a sound-box, an arm horizontal to and above the table and carrying the sound-box, the connection between the arm and sound-box being such that the latter can be turned upon the arm about a center co-axial with that of the arm, means for permitting that end of the arm carrying the sound-box to hinge about a horizontal axis, a stop and a corresponding engaging-piece one carried by the arm and the other by the sound-box and so disposed relatively to each other that when the sound-box is rotated to a given position the engaging piece and stop being brought into contact limit the movement of the sound-box about the horizontal hinge referred to, substantially as set forth.

18. In a sound-reproducing machine the combination of
a stationary "record-table," a bracket secured thereto and
extending over the same, a member rotatably mounted in
the bracket in a position vertical to the table and having
5 a horizontal extension or arm, a sound-box carried by this
extension, means for permitting lateral movement of the
sound-box, a motor carried by the bracket referred to, a
toothed wheel carried by the vertical rotatable member
in the bracket and engaging a toothed wheel of the motor
10 one of these wheels being of material other than metal,
and means for mounting one of the wheels friction-tight
upon its carrying member, substantially as set forth.

19. In a sound-reproducing machine the combination of
a stationary "record-table," a tubular arm horizontal to and

above the table, such arm being so shaped as to constitute 15
a tubular passage turned back upon itself, a sound-box
carried at one end of the arm in such manner that the
vibrations of the diaphragm are communicated to the air
within the arm, means for rotating the arm about a
vertical axis, and a vertical stationary trumpet having 20
a swivel connection with the arm and in open connection
with the interior of the same, substantially as set forth.

In testimony whereof I have signed my name to this
specification in the presence of two subscribing witnesses.

FREDERICK MYERS.

Witnesses :

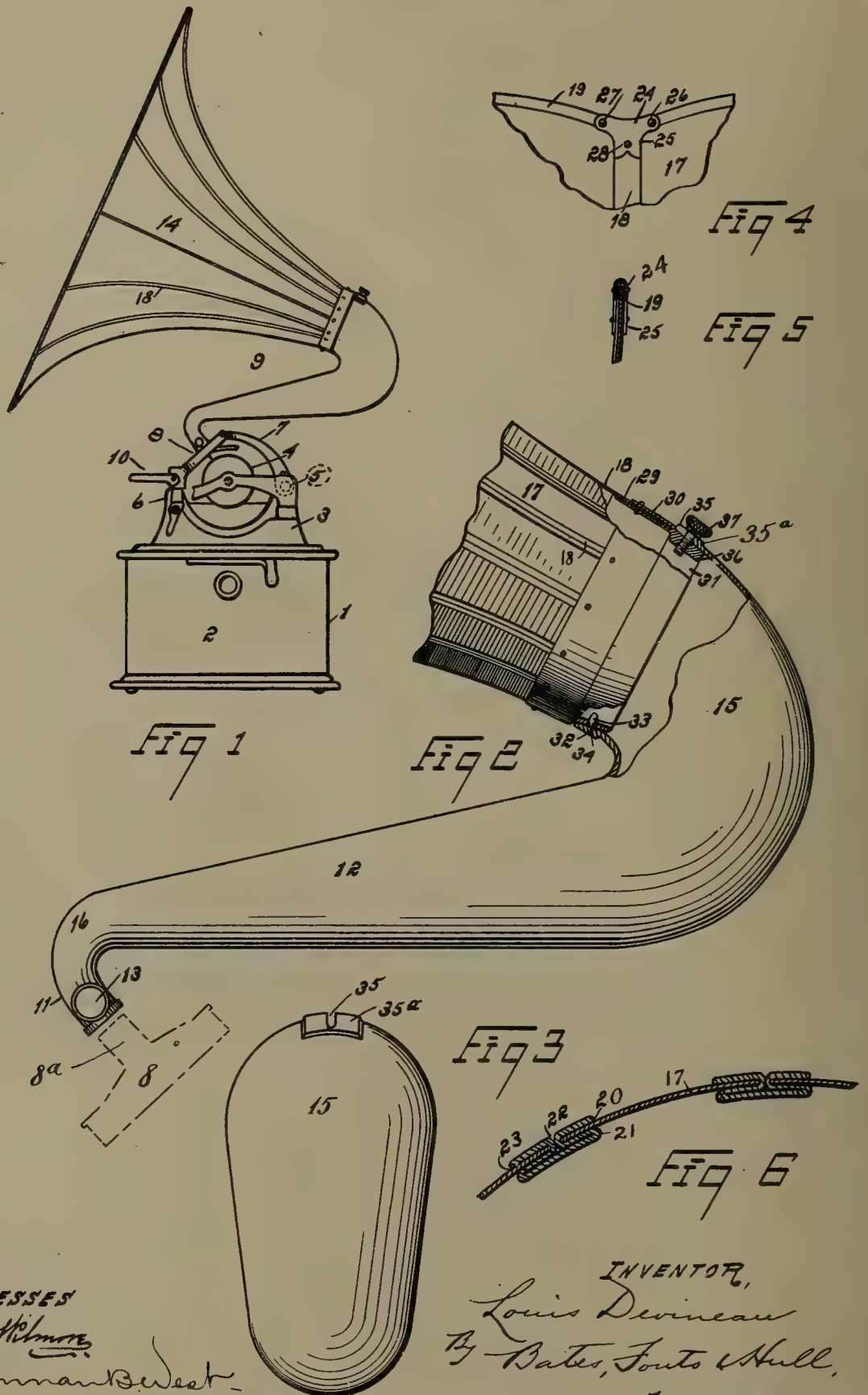
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No. 861,206.

PATENTED JULY 23, 1907.

L. DEVINEAU.
PHONOGRAPHIC HORN.
APPLICATION FILED FEB. 9, 1907.



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PHONOGRAPHIC HORN.

No. 861,206.

Specification of Letters Patent.

Patented July 23, 1907.

Application filed February 9, 1907. Serial No. 356,513.

To all whom it may concern:

Be it known that I, LOUIS DEVINEAU, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain
5 new and useful Improvement in Phonographic Horns, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

My invention relates to phonographic horns, and has
10 for its object to provide a horn which shall be of such size as to sufficiently amplify the sounds produced in the operation of phonographs and at the same time so construct and proportion the parts of said horn as to dispense with the necessity of using a special support
15 therefor, the horn being carried and supported entirely by the tubular portion of the reproducer.

A further object of the invention is to relieve the bearings on which the carriage traverses from undue friction.

20 A still further object of the invention is to produce a horn of this type which is extremely light and attractive in appearance and which may be conveniently assembled and disassembled.

I accomplish the above results by the construction
25 shown in the drawings forming part hereof, wherein

Figure 1 represents a side elevation of a phonograph of standard construction having my horn applied thereto; Fig. 2 represents an enlarged detail, partly in elevation and partly in section, of my horn, a portion
30 of the reproducer being shown in dotted lines; Fig. 3 represents an end elevation of the elbow of the horn; and Figs. 4, 5, and 6 represent details of the bell of the horn.

Describing the parts by reference numerals, 1 represents a phonograph, which may be of any approved
35 construction. The phonograph is associated with the box or base 2 wherein the mechanism is contained for rotating the mandrel and driving the carriage.

3 represents the frame within which is mounted the
40 mandrel 4. This frame is provided with a rod 5 and bearing plate 6 whereon the carriage 7 is supported which bears the reproducer 8 and horn 9.

10 represents the operating lever by which the reproducer stylus is lifted out of engagement with the cylindrical record and by means of which the carriage is then
45 shifted as desired.

The reproducer is provided with the ordinary tubular connection 8^a projecting upwardly therefrom to which the lower end 11 of the elbow 12 of the horn is
50 connected, such connection being made by fitting the lower end 11 over the tube and tightening up the set screw 13 carried by said end.

The horn proper comprises two separable elements, the elbow 12 to which reference has been made and the
55 bell 14. As will appear by reference to Figs. 1 and 2, this elbow is provided with a reduced, downwardly and

rearwardly extending end portion 11 adapted to fit over the tube 8^a projecting from the reproducers. From the upper end of 11, the body of the elbow extends rearwardly, gradually increasing in cross-sectional area to
60 the mouth thereof, the smooth portion of the elbow projecting forwardly and upwardly, as shown, from the bend 15. The elbow is made of metal and is considerably heavier in proportion to its dimensions than the bell. When connected to the reproducer, the main
65 body of the elbow extends rearwardly a considerable distance behind the mandrel 4, being bent upwardly and rearwardly at 16 and upwardly and forwardly at 15.

The bell 14 is connected to the elbow by having its lower or reduced end telescoped thereinto and secured
70 in place by a construction which will hereinafter be described in detail. This bell is of the flaring type and is of sufficient extent to adequately amplify the sounds produced by the phonograph. At the same time, owing to the rearward projection of the elbow, the front and
75 enlarged end of the bell but slightly overhangs the corresponding portion of the phonograph. This not only provides a compact construction of horn, but, as will more fully appear hereinafter, secures a distribution of the weight of the horn in such manner as to reduce to a
80 minimum the friction produced between the carriage and its bearings.

As previously stated, the elbow 12 is made of metal while the bell is made of extremely light material. I have found paper to be admirably adapted for the
85 main body of the bell and, by suitably reinforcing and strengthening the same with light metal, as aluminium, I am enabled to produce a bell which is not only efficient but extremely light of construction. The paper of which the body of the bell is constructed
90 is composed of a number of longitudinal segments 17 increasing in width from the bottom to the top thereof. These segments are connected by means of longitudinal ribs 18, and the mouth of the bell is bound around by metallic binding 19. The longitudinal
95 ribs 18 and binding 19 are of very light metal, preferably aluminium. As a simple and effective manner of connecting the longitudinal edges of adjacent segments, I may construct the ribs as shown more particularly in Fig. 6. At equal distances on each side
100 of the longitudinal center of the blank, the metal is bent back or folded upon itself and each side portion is again folded, the points of folding being so selected that the outer edges 20 will be substantially flush with the edge 21 of the folded metal therebeneath
105 and the inner edges 22 of the parts which are first folded will be in substantial contact. This can be accomplished by making the bend at about one-third the distance from the longitudinal center to the edge, then by making the next bend at substantially the
110 same distance from the first bend. This forms recesses 23 for the reception of the edges of the opposite

segments 17. By subjecting the metal to suitable pressure, a firm joint is made between adjacent segments and the main body of the bell is reinforced with but slight increase in weight.

5 The outer ends of the bell segments are bound by the metal binding 19 to which reference has been made hereinbefore. This binding is preferably of aluminium and is made up of a number of individual strips which embrace opposite sides of the outer edge of each segment and terminate a little short of the longitudinal seam between such segments. The ribs and binding segments 19 may then be connected by clips 24, shown more particularly in Figs. 4 and 5 and consisting each of a piece of metal bent upon itself to provide symmetrical branches each having an inwardly projecting portion 25, said portions being adapted to receive therebetween the outer end of a rib 18. Clips 24 have each a pair of side wings 26 adapted to receive the opposite ends of binding sections 19. By means of suitable rivets 27, 28, clamp 24 is secured to sections 19 and rib 18. This clamp may also be of aluminium and makes a light and firm connection between the ribs and the binding sections. The bell is provided at the lower end thereof with a light metal fitting which not only clamps together the lower or reduced ends of the segments of which it is composed but facilitates the application of the bell to the elbow. This fitting comprises an inner band 29 of thin metal and an outer band 30 of the same material, which are riveted together and to the ribs. The lower end of the inner band is extended considerably beyond the corresponding end of the outer band to form a neck 31 and said outer band may be connected to said neck, as by soldering.

35 The outer surface of the neck is tapered toward the end thereof to enable it to be easily inserted within the flaring inner face of the mouth 32 of the elbow. To enable the bell and elbow to be quickly connected and disconnected, I provide a pin 33 which projects upwardly from the lower portion of mouth 32, said pin being adapted to be inserted into a corresponding aperture 34 in the neck 31. Directly opposite pin 33, the mouth 32 is provided with a slot 35 extending inwardly from the outer edge thereof, the metal being suitably thickened at 35^a to prevent weakening the mouth by the provision of the slot and to form a bearing for the head of a thumb-screw. The corresponding part of neck 31 is thickened to form a suitable carrier 36 for the thumb-screw 37. By unscrewing the thumb-screw a suitable distance, the bell may be applied to the elbow by inserting pin 33 into aperture 34. Then by swinging the bell upwardly on said pin as a pivot, the upper portion of the neck 31 may be inserted within the corresponding portion of the elbow mouth and the shank of the screw simultaneously slid into the slot 35. Then by merely tightening the screw 37, the bell is effectively clamped in place. In order to remove the bell, it is only necessary to slack up the screw 37, allow the outer end or mouth of the bell to drop and then lift the lower portion of neck 31 off the pin 33.

By giving to my horn the peculiar shape shown and described and by making the elbow 12 of relatively heavier material than the bell, I am enabled to bring the center of gravity of the horn directly over the axis of the mandrel 4, which is midway between the

bearings, without sacrificing the size of the horn. This is an important advantage in that it distributes the weight of the horn evenly between the two carriage bearings 5 and 6, enabling the carriage with the attached horn to be moved along the frame with a minimum of friction. This result is furthered by the fact that the portions of the horn where the most metal is present (the connection between the bell and the elbow) is at the rear of the mandrel axis. Furthermore, the short distance between the center of gravity of the horn and the point of connection between the lower end of the elbow and the tubular extension 8^a of the reproducer enables a large horn to be used with no support other than said extension. Where the center of gravity of a horn is in front of the vertical plane midway between the bearings there is excessive friction on the slide 6, while if it were at the rear of that plane not only would the friction be excessive on the rod 5, but the horn would exert a tendency to tip the carriage over backward.

By the construction herein described, I have produced a phonographic horn which may be very conveniently and quickly taken apart for purposes of shipment and as quickly and conveniently assembled thereafter; which is light and cheap of construction and efficient in operation; which is so constructed and proportioned as to enable the carriage to traverse the mandrel with the development of a minimum amount of friction; and which requires no supporting means other than the tubular extension of the reproducer.

Having thus described my invention, I claim:

1. The combination with the mandrel, carriage, two supports along which the carriage travels, and the reproducer supported by the carriage between the supports, of a horn supported by the reproducer and having an elbow extending beyond one of the carriage supports, said horn having its center of gravity in a vertical line passing between said supports.
2. The combination with the mandrel and reproducer of a phonograph, of a phonographic horn, comprising an elbow connected to said reproducer, said elbow extending rearwardly of the mandrel, and a forwardly projecting bell on said elbow, a carriage in which the reproducer is mounted and two supports on which the carriage travels, the complete horn being supported by the reproducer and having its center of gravity in a vertical line passing between the supports for the carriage.
3. A phonographic horn comprising an elbow having a down-turned end adapted for connection with a reproducer, a tapering body portion extending rearwardly from said end and an up-turned mouth carried by said body portion, and a bell projecting forwardly from said mouth, combined with a record rotator and means for supporting the horn with its center of gravity over the axis of rotation, substantially as specified.
4. A phonographic horn comprising a metallic elbow having a down-turned end adapted for connection with a reproducer, a tapering body portion extending rearwardly from said end and an up-turned mouth carried by said body portion, and a bell of relatively light material detachably secured to said mouth and projecting forwardly therefrom, combined with rotatable means for supporting the record, and means for supporting the horn with its center of gravity substantially over the axis of rotation, substantially as specified.
5. The combination, with the mandrel and reproducer of a phonograph, said reproducer being provided with a tubular extension, of a horn having its lower end adapted for application to said tubular extension, said horn having its center of gravity in a plane substantially coincident with the axis of the mandrel, whereby the necessity for supporting means other than the tubular extension is dispensed with, substantially as specified.
6. The combination, with the mandrel and reproducer

of a phonograph, said reproducer having a tubular extension, of a large horn comprising an elbow and a bell, the lower end of said elbow being down-turned and adapted to be fitted to the tubular extension of the reproducer and
5 the body of said elbow projecting rearwardly beyond the mandrel and the bell projecting forwardly from the elbow, the center of gravity of the horn being in a vertical plane passing through the mandrel, whereby the necessity for any support other than the tubular extension is avoided,
10 substantially as specified.

7. The combination, with means for carrying and rotating a record, of a sectional horn having a flaring bell and a contracting elbow separable from each other and means for supporting the horn with its center of gravity
15 in a plane substantially coincident with the axis of rotation of the record.

8. The combination, with the mandrel, carriage and reproducer of a phonograph, of a horn comprising an elbow secured to the carriage by the reproducer, and a flaring
20 bell connected with the elbow and located over the main portion of the elbow and over the mandrel, the center of gravity of the horn being substantially coincident in the vertical plane through the axis of the mandrel.

9. A phonographic horn comprising a metallic elbow
25 having a down-turned end adapted for connection with a reproducer, a tapering body portion extending rearwardly from said end, an up-turned mouth carried by said body portion, and a bell of relatively light material detachably

secured to said mouth and projecting forwardly therefrom, combined with a reproducer supporting said horn, a carriage supporting said reproducer, and two supports on
30 which the carriage rides, the horn having its center of gravity in a vertical plane lying substantially midway between said supports.

10. The combination, with means for carrying and rotating a record, of a sectional horn having a flaring bell and a contacting elbow, separable from each other, a traveling carriage, two supports therefor, and a reproducer
35 carried by the carriage and supporting the horn with its center of gravity in a vertical line between said supports.

11. The combination with the mandrel, carriage, two parallel supports on which the carriage rides, and the reproducer supported by the carriage, of a horn comprising an elbow associated with the reproducer and supported by
40 the carriage, and a flaring bell separably connected with the elbow and located over the main portion of the elbow and over the mandrel, the vertical line through the center of gravity of said horn passing between said supports, whereby the weight of the horn is distributed thereon.

In testimony whereof, I hereunto affix my signature in
45 the presence of two witnesses.

LOUIS DEVINÉAU.

Witnesses:

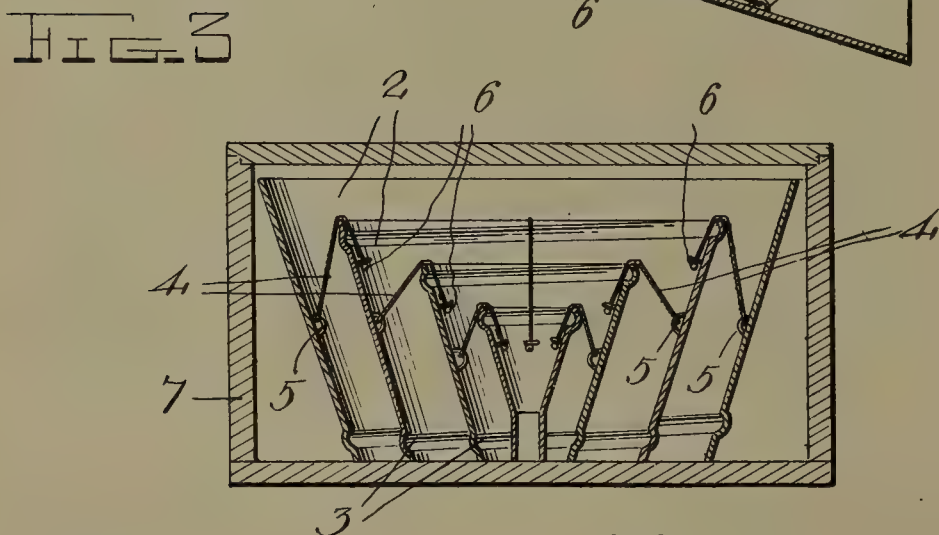
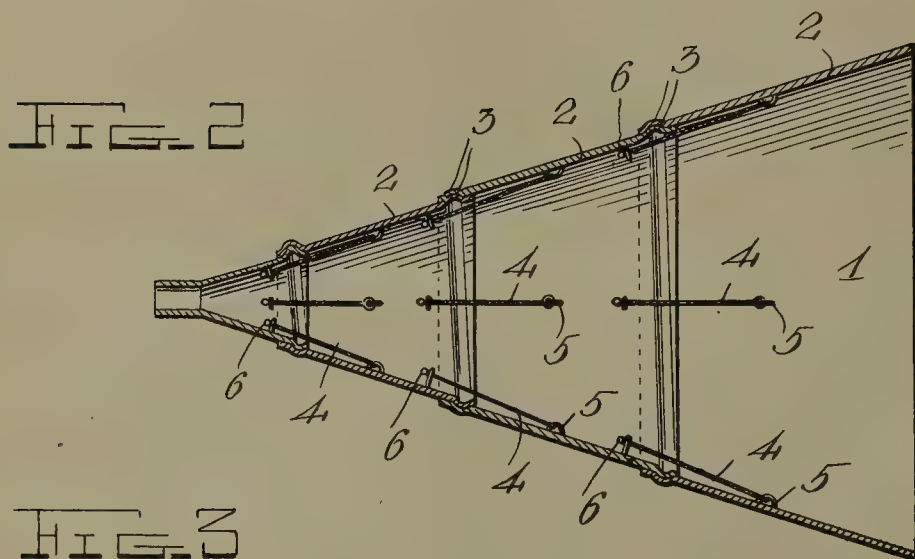
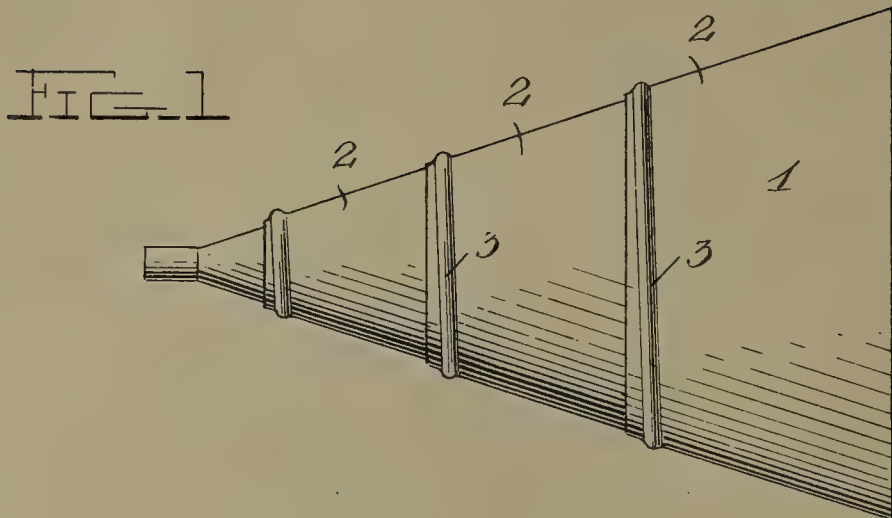
W. L. MCGARRELL,
J. B. HULL.

No. 861,648.

PATENTED JULY 30, 1907.

H. GROSS.
PHONOGRAPH HORN.

APPLICATION FILED APR. 12, 1906.



Witnesses
C. H. Griesbauer.

Inventor
Henry Gross
by *A. B. Wilson & Co.*
Attorneys

UNITED STATES PATENT OFFICE.

HENRY GROSS, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO FRANK SHILLER, OF NEW YORK, N. Y.

PHONOGRAPH-HORN.

No. 861,648.

Specification of Letters Patent.

Patented July 30, 1907.

Application filed April 12, 1906. Serial No. 311,390.

To all whom it may concern:

Be it known that I, HENRY GROSS, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented

5 certain new and useful Improvements in Phonograph-Horns; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

10 This invention relates to improvements in collapsible phonograph horns.

The object of the invention is to provide a phonograph horn formed of collapsible telescopic sections provided with means for holding the sections against

15 disengagement at all points when extended, and against longitudinal movement in both directions.

With the above and other objects in view, the invention consists of certain novel features of construction, combination and arrangement of parts, as will be hereinafter described and claimed.

In the accompanying drawings:—Figure 1 is a side view of the horn with the parts arranged in position for use; Fig. 2 is a longitudinal sectional view of the horn with the parts in the position shown in Fig. 1; and

25 Fig. 3 is a sectional view through the horn, showing the same collapsed and arranged in the box or case for convenient transportation.

Referring more particularly to the drawings, 1 denotes the horn as a whole which is formed of a series of

30 frusto-conical telescoping sections 2, the diameter of the larger end of each of said sections being substantially the size of or a little larger than the inner small end of the next adjacent section, thereby permitting said sections to be drawn outwardly until the walls adjacent to

35 said outer and inner ends come into engagement, thereby forming a funnel-shaped horn.

In order to prevent the sections of the horn from collapsing when the same is in use, the engaging edges of the ends of the sections are provided with screw threads

40 3 which are adapted to be engaged by a slight turn of said sections after the same have been drawn out to an operative position.

In order to prevent any possibility of the sections of the horn from being pulled apart when drawn out, said

sections are provided with retaining cords, chains or 45 other flexible connections 4, of which there are preferably four for each section, the same being shown in the drawings as cords, said cords being arranged at diametrically opposite points on the inner side of the sections. The outer ends of each of the cords are secured to the 50 inner sides of the sections near their outer ends in any suitable manner, while the inner ends of the cords are connected with the next adjacent section, preferably by means of eyes or loops 5 secured to the inner sides of said section, as shown. The inner ends of the cords 55 have formed therein knots, whereby the same are prevented from pulling through said eyes and the sections of the horn prevented from being entirely separated or pulled apart.

A phonograph horn constructed as herein shown and 60 described may be readily drawn out to an operative position or collapsed into a convenient form adapted to be placed in a suitable box or case 7 by which the same may be readily carried.

From the foregoing description, taken in connection 65 with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion and the minor details of construction may be resorted to without 70 departing from the principle or sacrificing any of the advantages of this invention, as defined by the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters-Patent, is:— 75

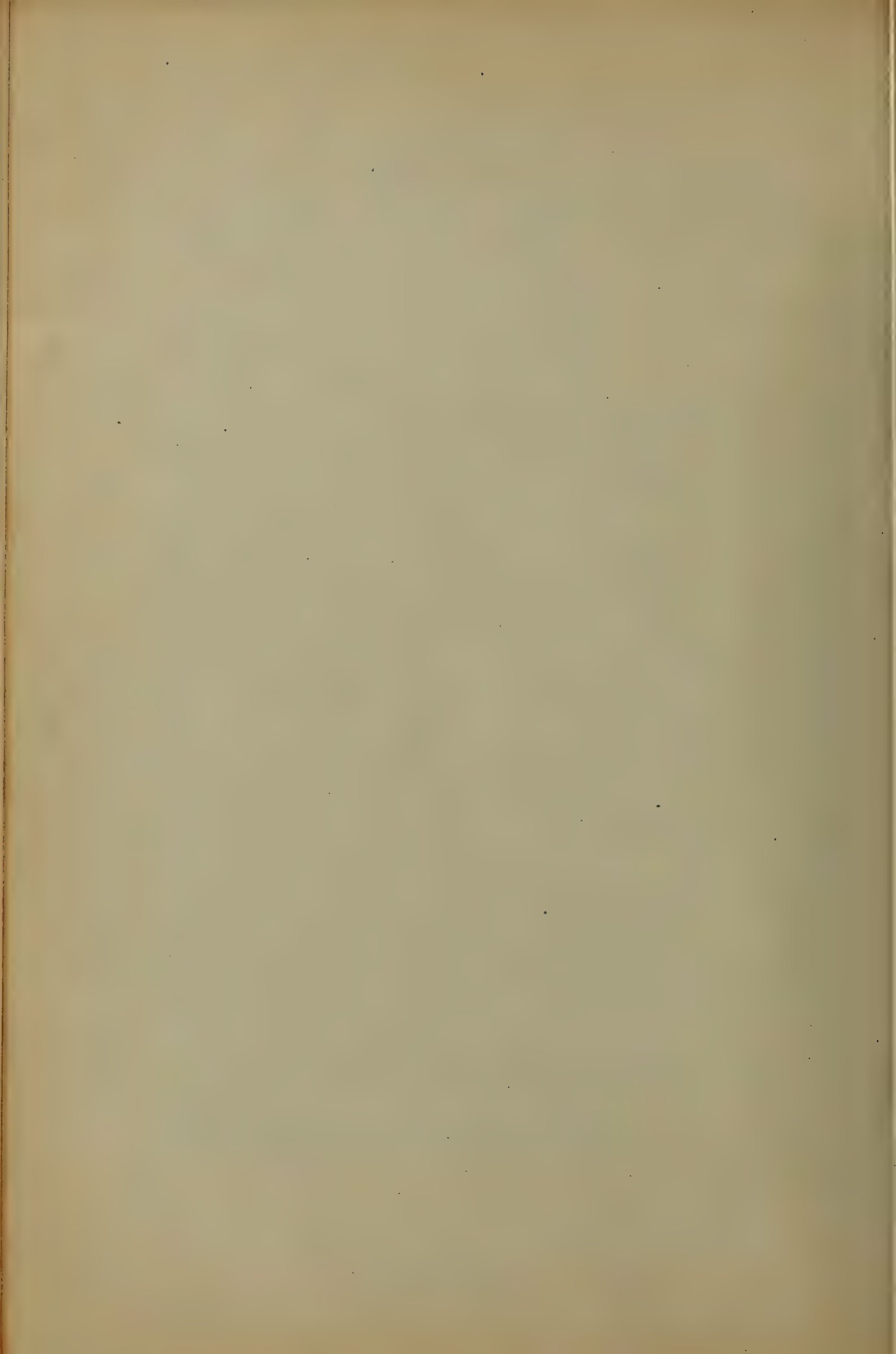
A phonograph horn comprising a plurality of frusto-conical nestable sections, the adjacent sections having a groove in one and a rib on the other of the meeting ends, extending therearound to engage and hold the sections against disengagement at all points when extended and 80 against longitudinal movement in both directions, each section having a plurality of laterally-spaced eyes on its inner face and flexible members connected with the eyes of the adjacent section to hold said sections in position ready for assembling when the horn is collapsed. 85

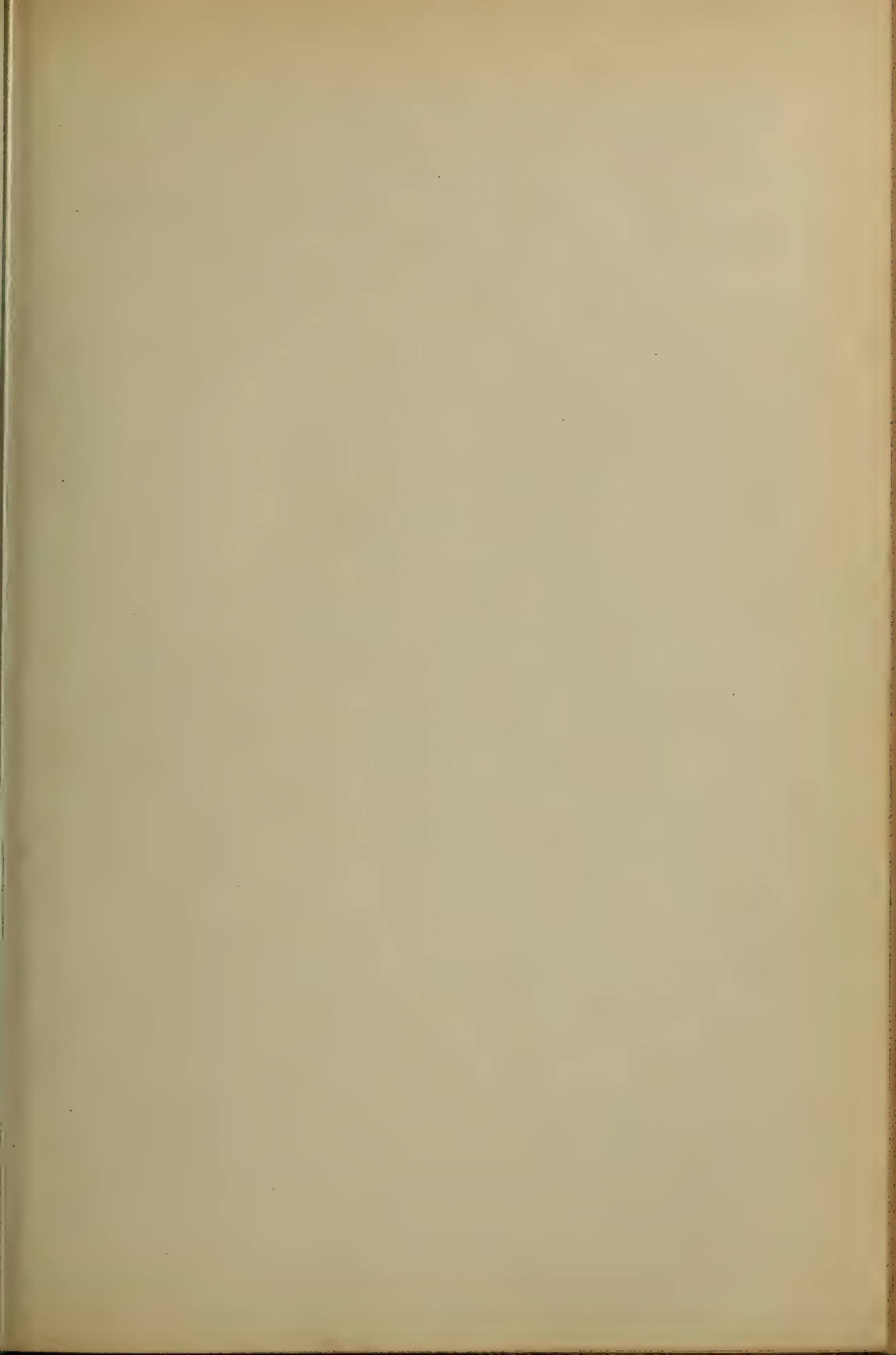
In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HENRY GROSS.

Witnesses:

ERIC E. HANSSON,
ERNST M. HANSSON.





No. 861,827.

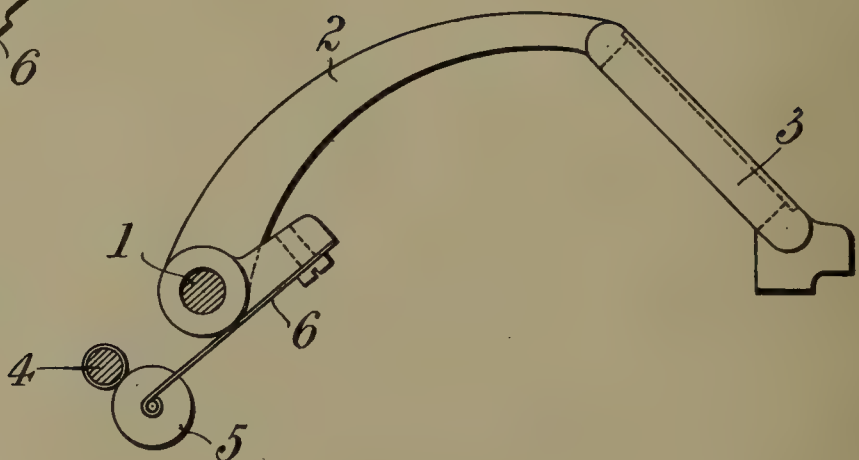
PATENTED JULY 30, 1907.

C. G. GARRARD.
PHONOGRAPH, GRAPHOPHONE, &c.
APPLICATION FILED FEB. 1, 1907.

Fig. 2.



Fig. 1.



WITNESSES.

W. M. Finnerel.
Lillie M. Perry.

INVENTOR.

Charles George Garrard
by W. M. Finnerel
Att'y

UNITED STATES PATENT OFFICE.

CHARLES GEORGE GARRARD, OF LONDON, ENGLAND, ASSIGNOR TO EDISON-BELL CONSOLIDATED PHONOGRAPH COMPANY LIMITED, OF LONDON, ENGLAND.

PHONOGRAPH, GRAPHOPHONE, &c.

No. 861,827.

Specification of Letters Patent.

Patented July 30, 1907.

Application filed February 1, 1907. Serial No. 355,295.

To all whom it may concern:

Be it known that I, CHARLES GEORGE GARRARD, a subject of His Majesty the King of Great Britain, residing at London, England, have invented a certain new and useful Improvement in Phonographs, Graphophones, and the Like, of which the following is a specification.

This invention relates to phonographs, graphophones and the like and particularly to the driving mechanism thereof with the object of effecting certain improvements therein.

It has hitherto been the practice to traverse the stylus upon the blank or record by providing the arm which carries said stylus with a half nut adapted to engage the feeding screw, whereby the revolution of the latter causes the half nut to travel from end to end thereof in the well known manner. The employment of a half nut however is found to be objectionable on account of the excessive amount of friction set up between it and the feeding screw, and the object of the present invention is to substitute for the half nut a revoluble device which will engage the threads of the positively driven feeding screw and revolve while traveling thereover thereby lessening the friction between the two parts. A convenient means for effecting this purpose is to mount in any convenient position upon the stylus-carrying arm and by any suitable means a revoluble disk or disks having its, or their, peripheral edge, or edges, shaped or formed so as to engage readily with the threads upon the feeding screw, whereby when the latter is revolved the disk or disks will also revolve and at the same time travel lengthwise of the feeding screw carrying the arm and stylus with it in the well understood manner.

In place of the disk or disks, a roller having one or more grooves of a pitch corresponding to that of the screw, may be used, or any other revoluble attachment to the arm may be employed having a like purpose and effect.

In the accompanying drawings:—Figure 1 is an end

elevation of so much of a phonograph as is necessary to illustrate the present invention, and Fig. 2 is a detached view of one form of revoluble device adapted to engage with the feeding screw.

In said drawings 1 is the plain shaft pivotally carrying the stylus arm 2 on which is the usual diaphragm 3 carrying the stylus while 4 is the positively driven feeding screw with which is adapted to engage a pair of disks 5 rotatably mounted on arm 6 which is secured to arm 2. As seen a pair of disks are employed but it is obvious that a single or several disks may be employed or a roller having one or more grooves of a pitch corresponding to the thread of the leading screw may be equally well employed.

What is claimed is:—

1. In phonographs, graphophones and the like, the combination of a positively driven feeding-screw, a stylus-carrying arm to be moved by said feeding-screw, and a disk rotatably mounted upon said arm and adapted to be engaged with and rotated by said feeding-screw during the feeding operation.

2. In phonographs, graphophones and the like, the combination of a positively driven feeding-screw, a stylus-carrying arm pivotally mounted adjacent to said feeding-screw, and a revoluble device carried by said arm adapted to be engaged with and rotated by said feeding-screw during the feeding operation, and to be disengaged therefrom, whereby said arm may be returned to its starting position.

3. In phonographs, graphophones and the like, the combination of a positively driven feeding-screw, a shaft arranged parallel with said feeding-screw, a stylus-carrying arm pivotally mounted upon said shaft, and a revoluble device carried by said arm and adapted to be engaged with and rotated by said feeding-screw to move said arm in one direction, and to be disengaged from said feeding-screw, whereby said arm may be returned to its starting position.

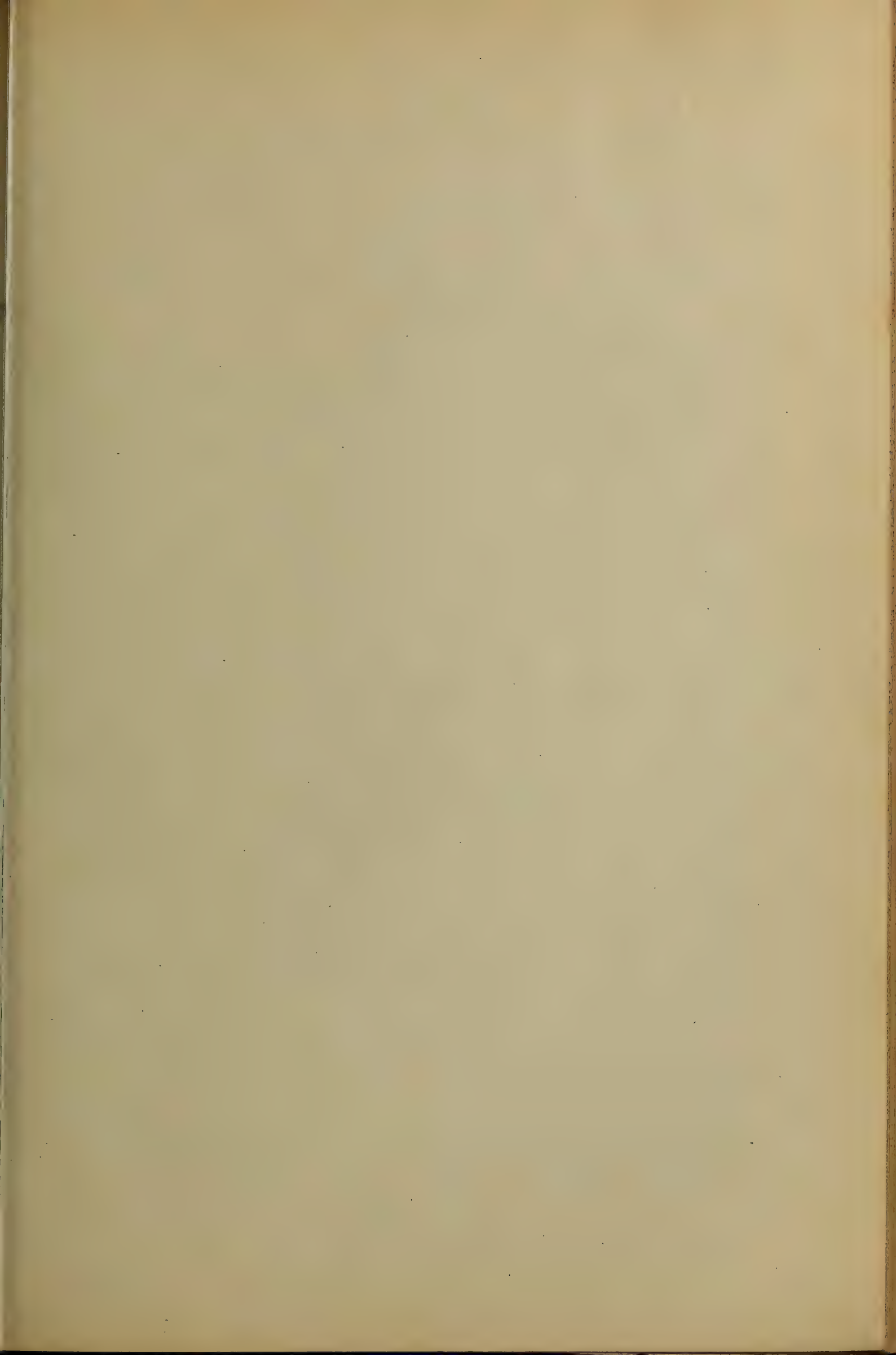
In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES GEORGE GARRARD

Witnesses:

PERCY WILLIS,

FREDRICH WILLIAM PLEASANCE.



No. 862,407.

PATENTED AUG. 6. 1907.

T. H. MACDONALD.
TALKING MACHINE RECORD.
APPLICATION FILED JULY 9, 1906.

Fig. 1.

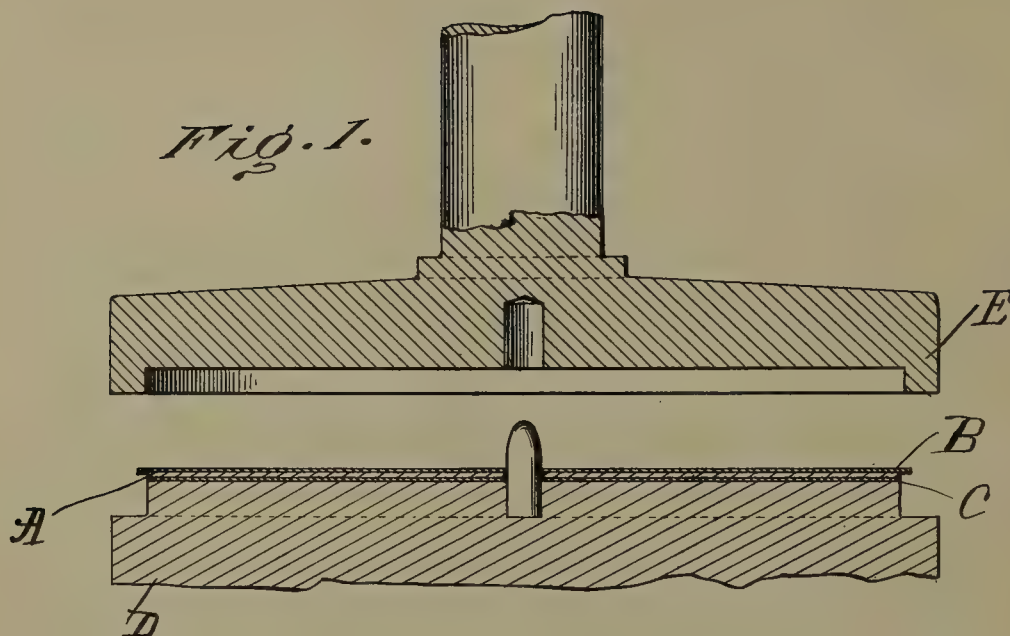
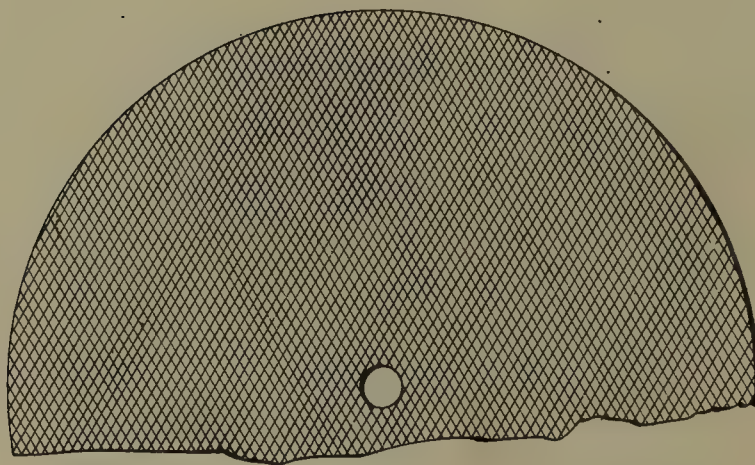


Fig. 2.



Inventor

Witnesses
Asbury A. Thompson.
Ruth C. Fitzhugh.

Thomas H. Macdonald,
By
Mauro, Cameron, Lewis & Massie
Attorneys

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

TALKING-MACHINE RECORD.

No. 862,407.

Specification of Letters Patent.

Patented Aug. 6, 1907.

Application filed July 9, 1906. Serial No. 325,413.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, of Bridgeport, Connecticut, have invented a new and useful Improvement in Talking-Machine Records, which improvement is fully set forth in the following specification.

This invention has reference to the production of sound-records of disk form impressed in celluloid. This material has long been recognized as having desirable properties for use as a sound-recording material, but it has not heretofore been employed commercially for the manufacture of disk records. The reasons for this are mainly that celluloid is too expensive to be employed in a sheet of sufficient thickness to give the desired rigidity, and although it has long been known that celluloid unites readily under heat and pressure with paper or cardboard, either with or without sizing, such compound disk quickly warps to such an extent as to spoil the appearance and usefulness of the sound-record.

I have discovered that a commercially successful celluloid record can be made by inclosing a cardboard sheet between two sheets of celluloid which are of the same thickness and quality. The uniformity of thickness and quality of the celluloid sheets is essential to prevent warping.

In carrying out the invention a sheet of cardboard is placed between two thin sheets of celluloid, one of these sheets being slightly larger in diameter than the other sheet and the cardboard disk. The three sheets are placed in the press, and compressed between the heated matrix and die in the usual way, thereby impressing a sound-record in the surface of one of the celluloid sheets. The act of compression unites the three sheets into a coherent disk, and at the same time the projecting margin of the wider celluloid disk is drawn over the edge of the cardboard and against the edge of the other celluloid disk. The heat and pressure of the hydraulic press seal the edges of the two celluloid sheets together. The disk is removed from the press and the slight surplus material is then removed in a rapidly revolving lathe. The result is a sound-record composed of a cardboard disk hermetically sealed between two sheets of celluloid.

It is preferred that the under disk of celluloid should have a roughened surface, such as produced by the use of a die whose surface is covered by fine lines close together and crossing at right angles.

In the accompanying drawings, Figure 1 is a cross-section illustrating the record in process of formation, the thickness of the several sheets being very much ex-

aggerated. Fig. 2 is a plan view of part of the underside of a finished record showing the roughened surface.

A represents the core of cardboard, which may or may not have the surfaces coated with sizing in the usual way of making a compound sheet of paper and celluloid.

B represents the facing sheet of celluloid and C the backing sheet of celluloid of the same thickness and quality as B.

The three sheets are placed between the die D and matrix E, the latter having on its surface a sound-record in reverse, and are subjected to heat and heavy pressure in the usual way. By this means the sound-record is impressed in sheet B, and the three sheets are united together. Furthermore, the projecting margin of sheet B (which is slightly larger than sheet C) is drawn over the edge of the cardboard disk and united firmly to the edge of sheet C.

The surface of the die D is roughened so as to produce on the back disk C a roughened surface, such as shown in Fig. 2 consisting preferably of fine grooves intersecting at right angles. Instead of roughening the rear surface in this manner another sound-record may be impressed thereon.

By this means a sound-record may be produced whose total thickness is less than a sixteenth of an inch and will not warp under ordinary conditions of service and exposure. The product of this process is much lighter than the ordinary disk record, and is not brittle as is the latter. Further advantages, however, are absence of extraneous sounds (the surface being a close approximation to absolute smoothness) and greatly increased durability. The celluloid record will yield many times the number of reproductions that an ordinary record will give, and it shows, after a very large number of reproductions, no deterioration of quality. Moreover, it is not necessary with the new celluloid record to change the needle after each reproduction. The needle may be used for a score or more times without detriment.

What is claimed is:

1. A sound-record of disk shape composed of two sheets of celluloid inclosing between them and united to a sheet of cardboard, said celluloid sheets being of the same thickness and quality.

2. A sound-record of disk shape, composed of two sheets of celluloid inclosing between them a sheet of cardboard, said celluloid sheets being of the same thickness and quality, and being united at the edges so that the cardboard is entirely inclosed in a celluloid envelop of uniform thickness.

3. A sound-record of disk shape composed of two sheets of celluloid inclosing between them and united to a sheet

of cardboard, said celluloid sheets being of the same thickness and quality, one sheet having impressed in it a sound-record, and the other having its surface roughened.

- 5 4. The method of making a sound-record by placing a cardboard disk between two disks of celluloid of the same thickness and quality, one celluloid disk being of slightly greater diameter than the cardboard disk, applying heat and pressure to the three disks, impressing a sound-record in the outer surface of one celluloid disk, roughening the

outer surface of the other celluloid disk, and sealing the 10 cardboard entirely between the disks of celluloid.

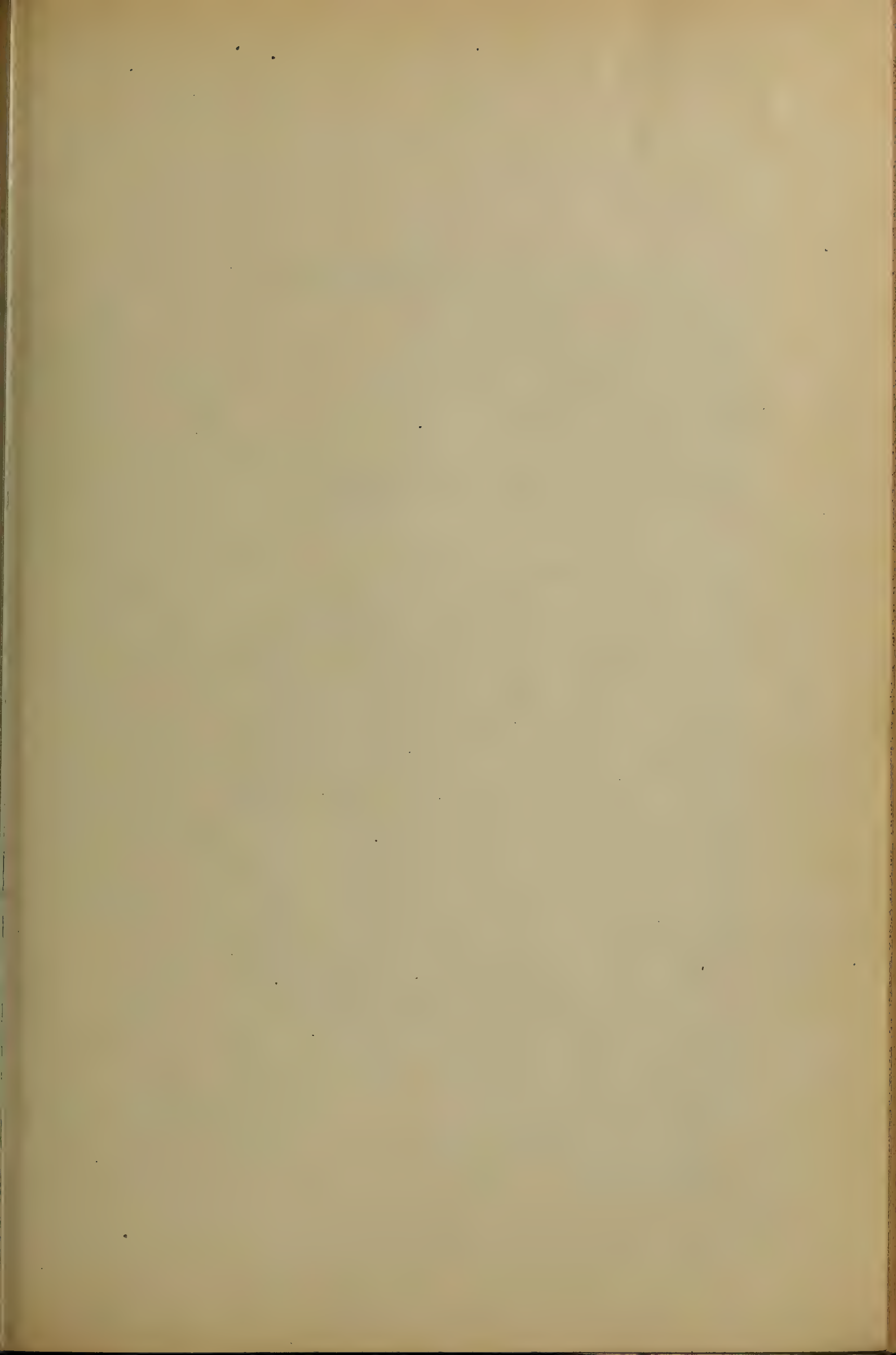
In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOS. H. MACDONALD.

Witnesses:

BESSIE J. BURR,

C. A. GIBNER.

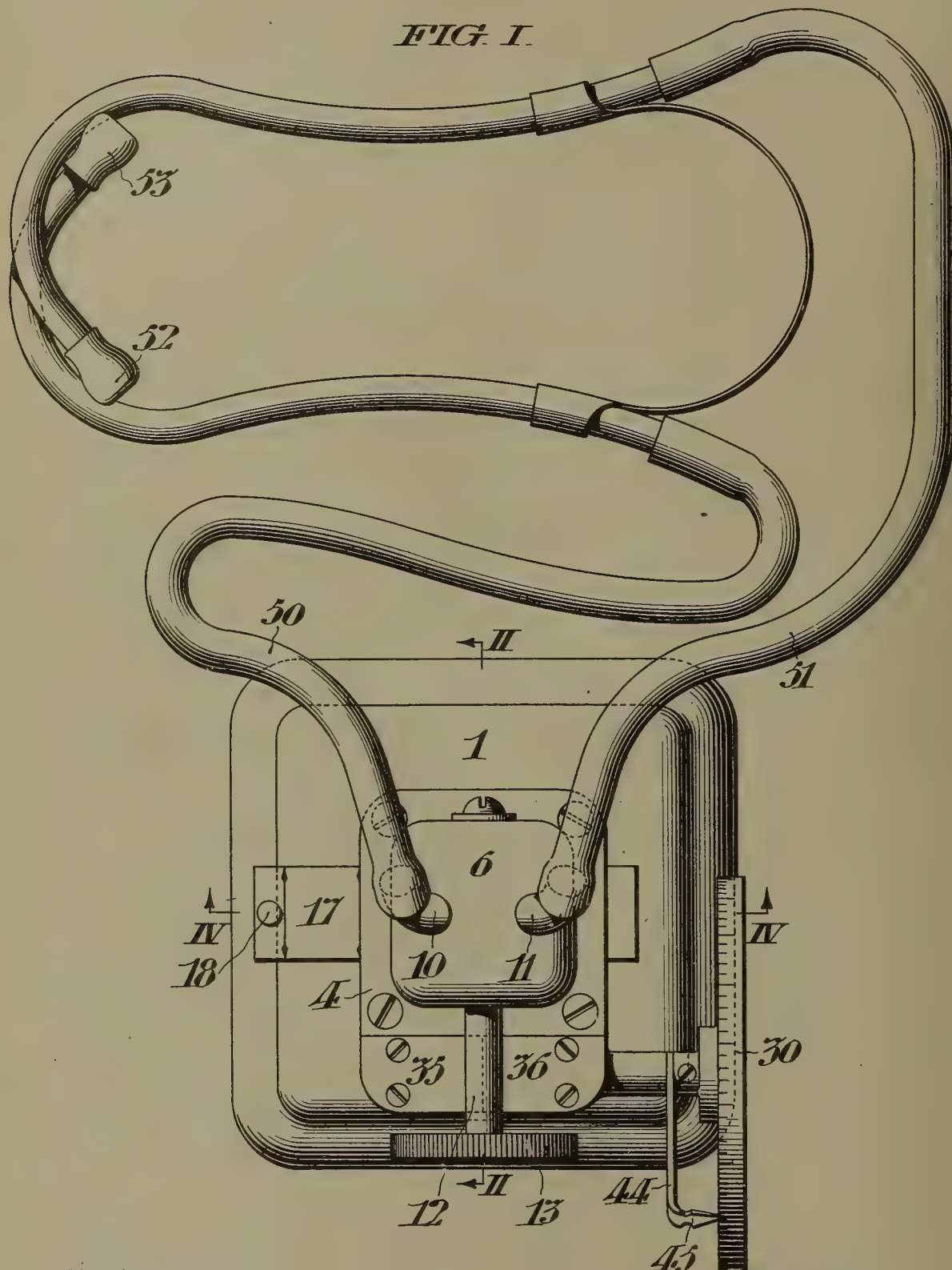


J. M. McCALLIE.
AUDIOMETER.

APPLICATION FILED MAR. 7, 1907.

4 SHEETS—SHEET 1.

FIG. I.

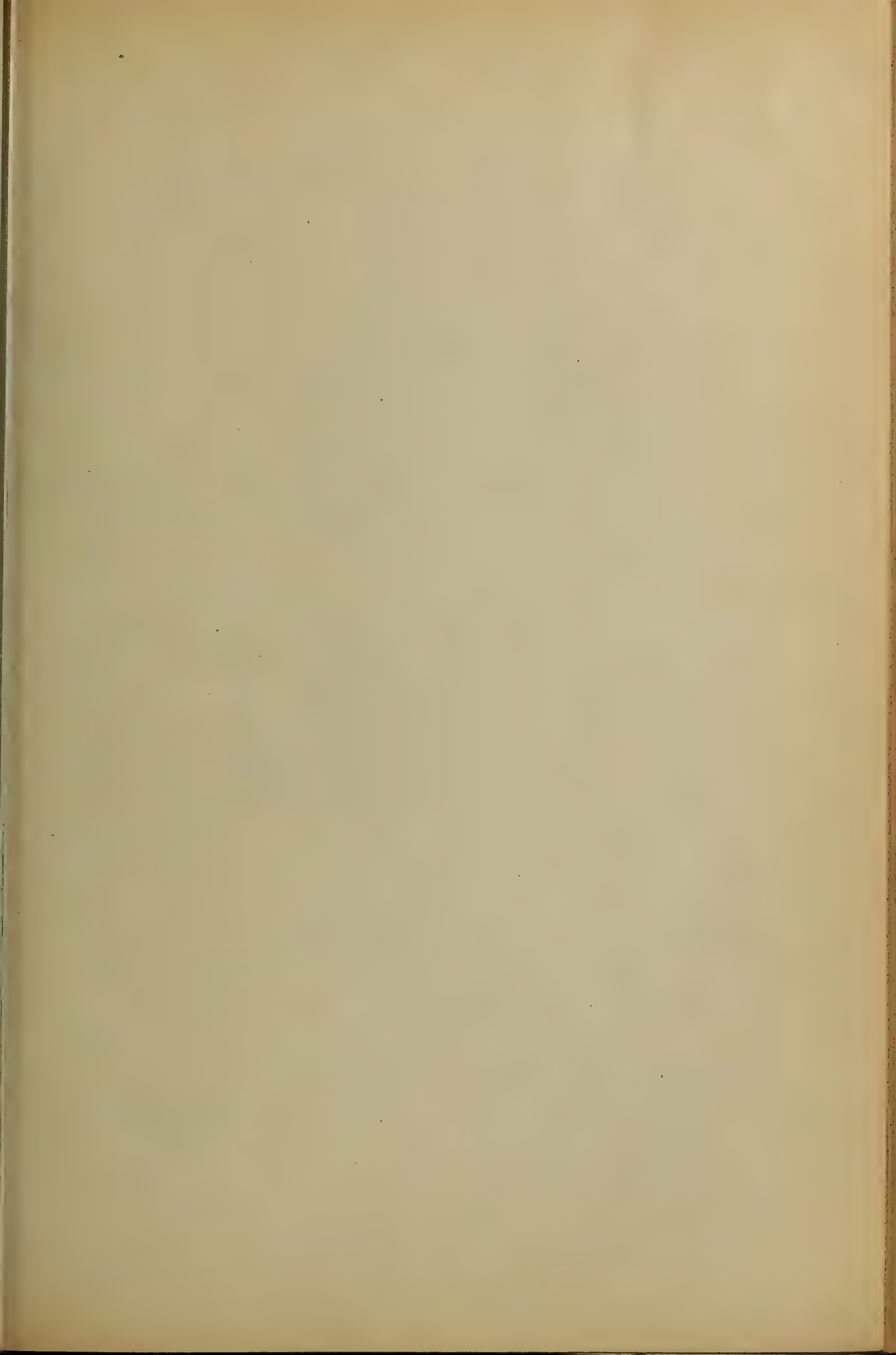


WITNESSES:

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INVENTOR:

JOSEPH M. McCALLIE,
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Attorneys.



J. M. McCALLIE.

AUDIOMETER.

APPLICATION FILED MAR. 7, 1907.

4 SHEETS—SHEET 2.

FIG. II.

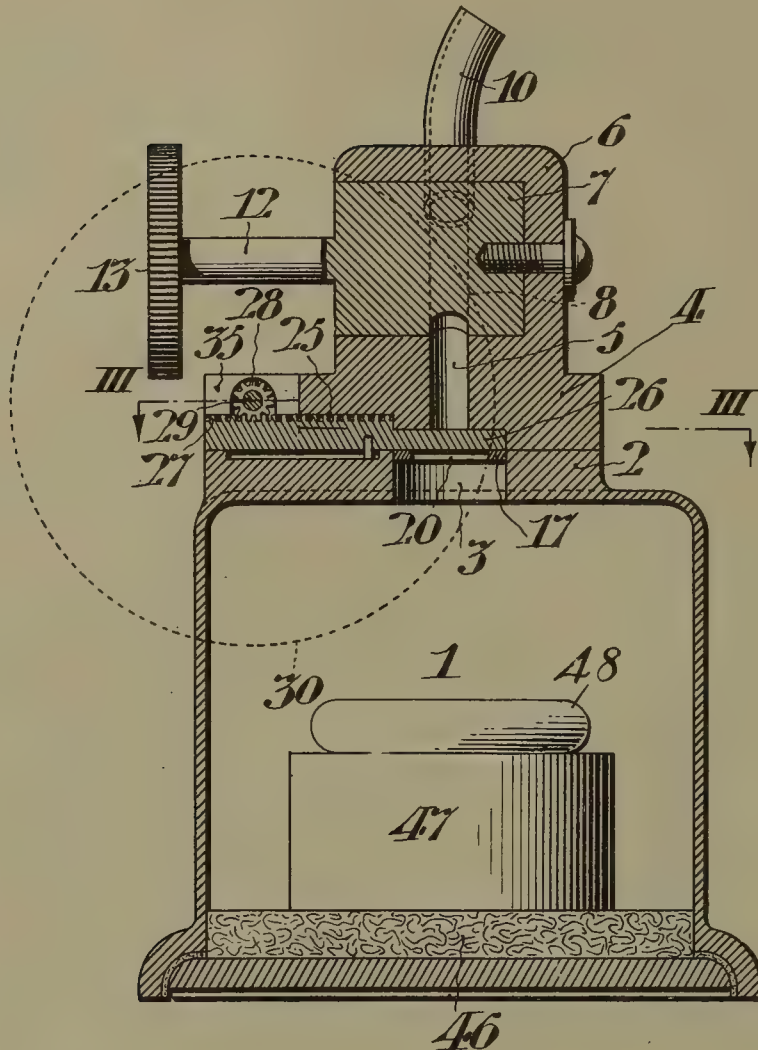
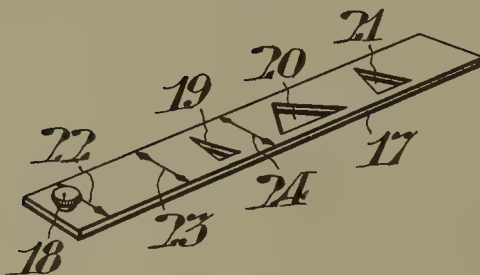


FIG. VI.

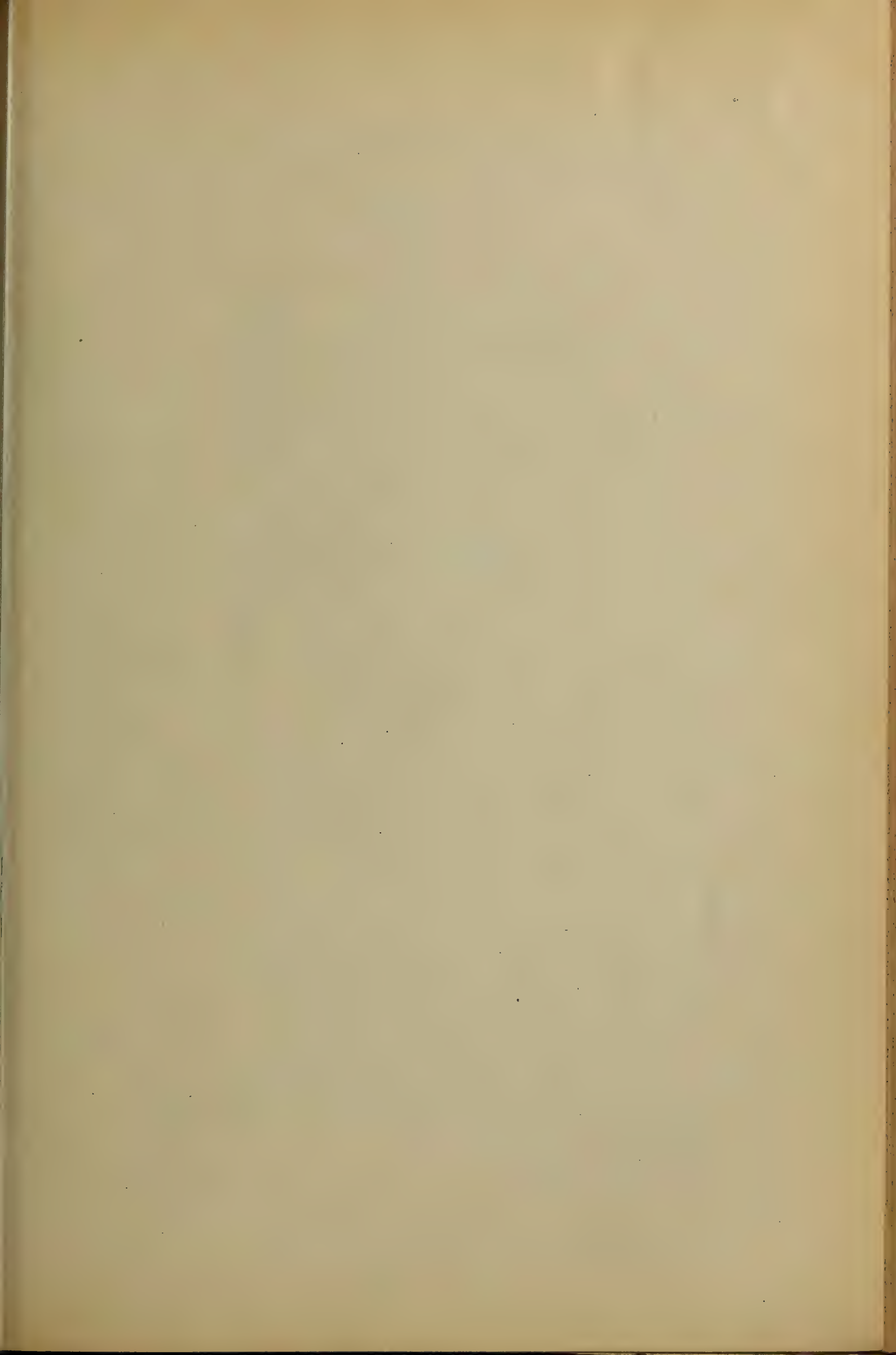


WITNESSES:

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By Haley & Paul
Attorneys.



J. M. McCALLIE.
AUDIOMETER.

APPLICATION FILED MAR. 7, 1907.

4 SHEETS—SHEET 3.

FIG. III.

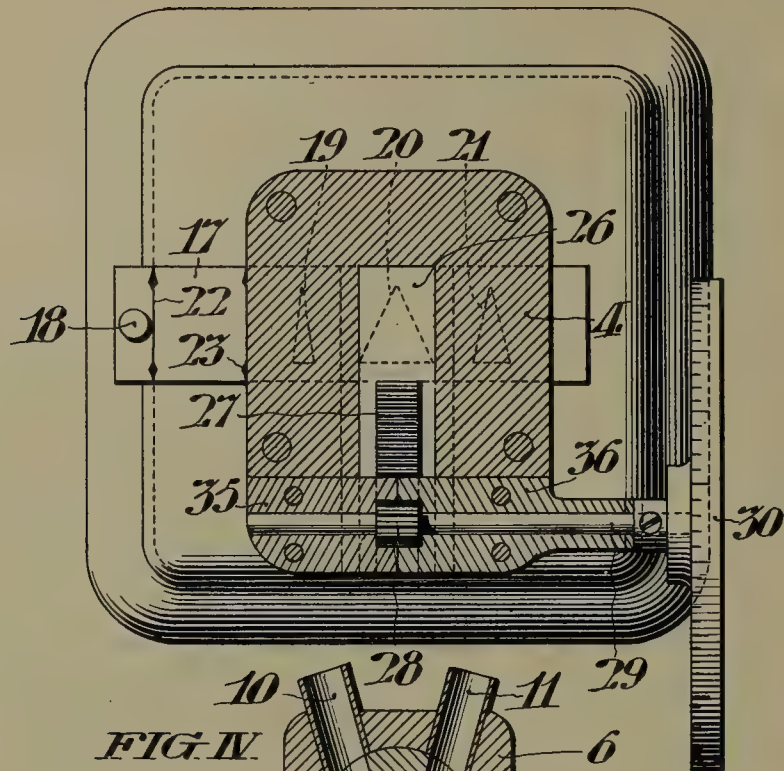
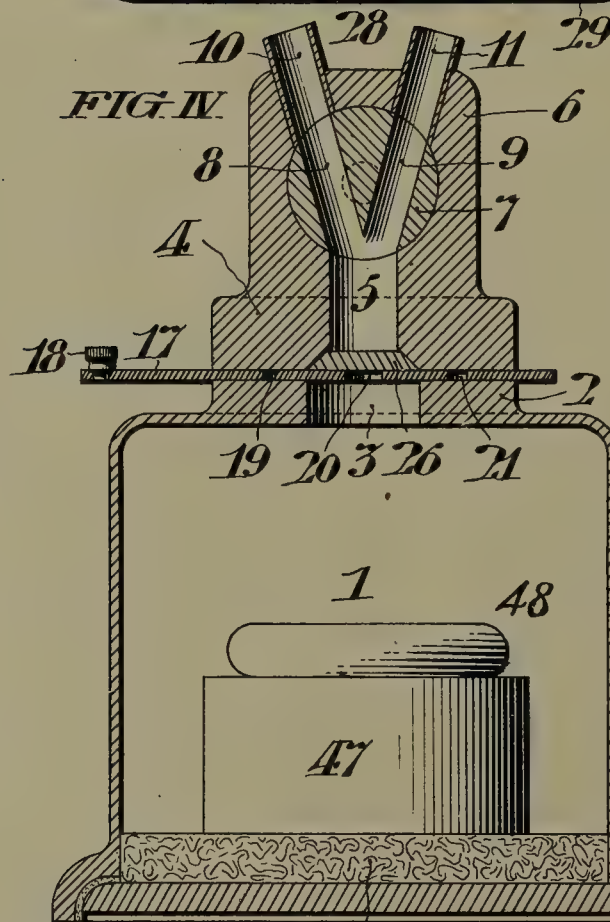


FIG. IV.

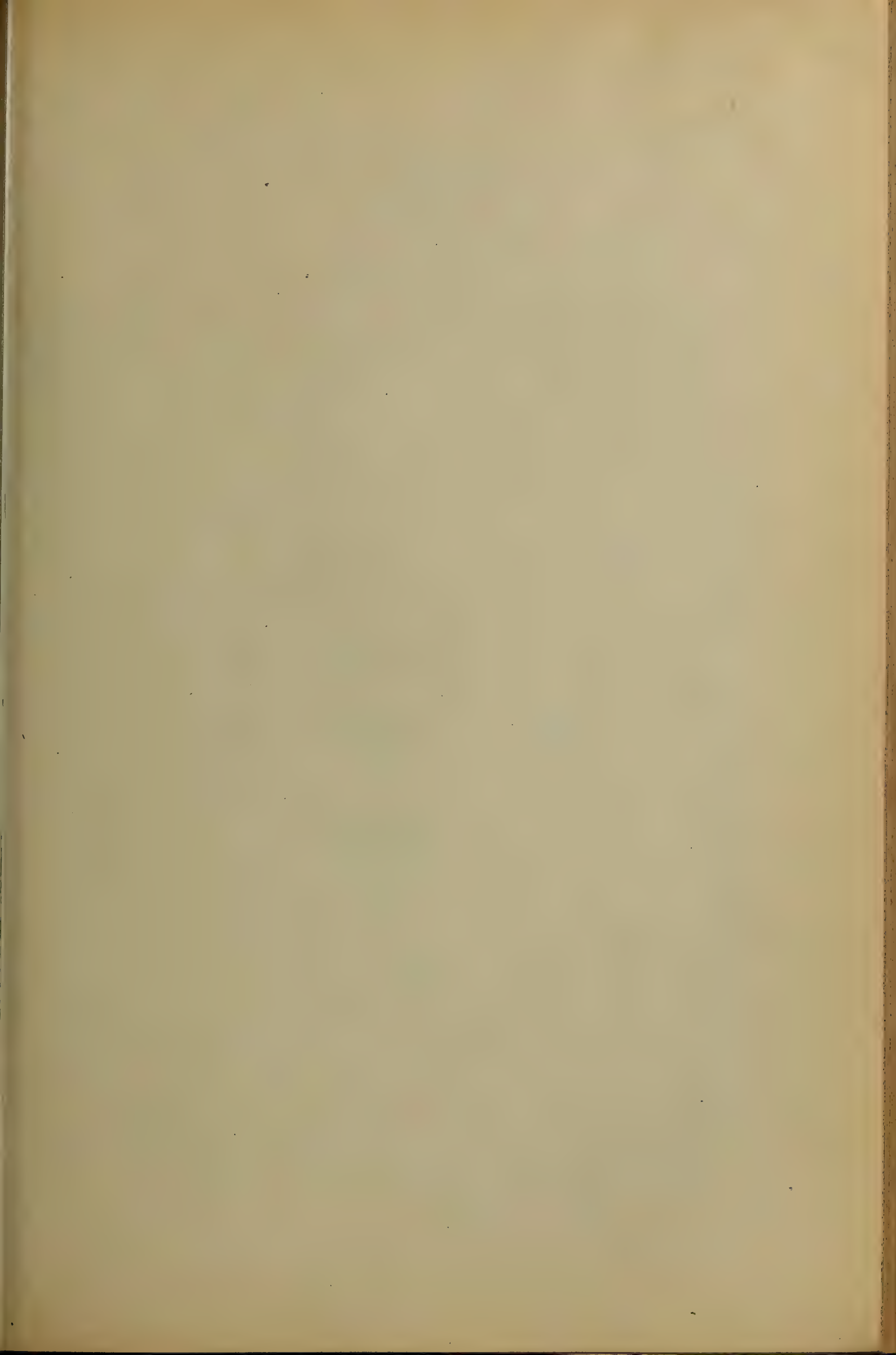


WITNESSES:

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Wm. J. Speck.

INVENTOR:

JOSEPH M. McCALLIE,
By Foley & Paul
Attorneys.



No. 862,501.

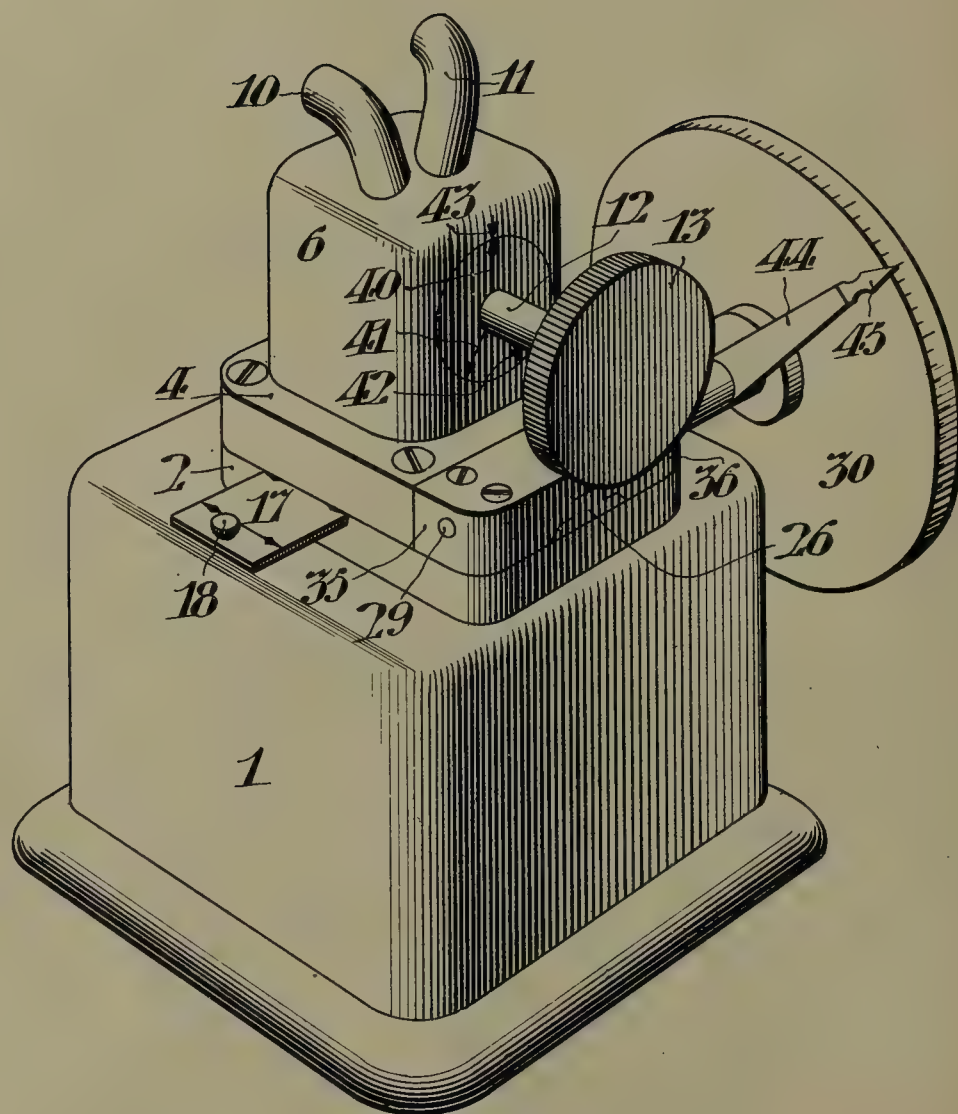
PATENTED AUG. 6, 1907.

J. M. McCALLIE.
AUDIOMETER.

APPLICATION FILED MAR. 7, 1907.

4 SHEETS—SHEET 4.

FIG. V



WITNESSES:

John C. Bergner
Wm. J. Spurl

INVENTOR:

JOSEPH M. McCALLIE,
By Kelly & Paul
Attorneys.

UNITED STATES PATENT OFFICE.

JOSEPH M. McCALLIE, OF TRENTON, NEW JERSEY.

AUDIOMETER.

No. 862,501.

Specification of Letters Patent.

Patented Aug. 6, 1907.

Application filed March 7, 1907. Serial No. 361,033.

To all whom it may concern:

Be it known that I, JOSEPH M. McCALLIE, of Trenton, in the county of Mercer and State of New Jersey, have invented a certain new and useful Audiometer, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to an instrument which is adapted to test the acuteness of human hearing, and, in its most complete embodiment, to enable comparison of the results in individual cases with a predetermined standard.

An ordinary method of testing hearing of individuals is to employ a sound emitting device, such as a watch, which is successively placed at more and more remote distances from the person subjected to the test, until the sound ceases to be audible, application being made of the familiar rule that the sound impressions upon the ear diminish in accordance with the square of the distance.

The object of my invention is to furnish a compact apparatus not requiring adjustment of the sound emitting device at different distances from the person subjected to the test and the consequent ascertainment of such distances by measurement, but which, nevertheless, permits the employment of the same general principle as to the diminution of audibility and presents the results of a given test immediately and directly to the observer.

In the accompanying drawings, Figure I, represents a plan view of an apparatus embodying my invention and provided with the flexible tubes, of the same general character as ordinary stethoscope tubes, which I prefer to employ in connection therewith. Fig. II, is a vertical section on a plane of the line II, II, of Fig. I. Fig. III, is a horizontal sectional view on the two planes indicated by the lines III, III, of Fig. II. Fig. IV, is a vertical section at right angles to that of Fig. III, and on the plane of the line IV, IV, of Fig. I. Fig. V, is a perspective view of the apparatus. Fig. VI, is a perspective view of the adjustable slide for affording sound openings of different fixed area, the purpose of which will be explained hereafter. In Figs. II, IV, and V, the flexible tubes are omitted for purpose of convenience.

Generally speaking, my invention in its fullest embodiment comprises a receptacle adapted to so inclose a sound emitting object as to prevent the transmission of sound audible to the human ear, except through an aperture provided for that purpose; means for progressively varying the area of said aperture and for indicating the extent thereof at a given movement; means for employing openings of selected areas for the purpose of such subsequent variation; and means

whereby either or both ears of the person undergoing the test may be placed in communication with the source of sound.

Referring to the drawings, 1, indicates the closed receptacle, preferably of metal, which is conveniently made of the approximate cubical form shown. Upon a portion of the top of the receptacle 1, and preferably integral therewith, is a raised bed plate 2, through which a vertical passage 3, of circular cross section, extends. This bed plate may extend laterally as shown, to one edge of the receptacle, and supports a casing 4, whose upper portion 6, is somewhat reduced in size, as indicated.

The upper portion of the casing contains a cylindrical valve 7, adapted to turn upon a horizontal axis and provided with a shaft 12, and hand wheel 13. This valve is provided with two passages 8, and 9, respectively, which merge into an oblong opening at one extremity, but diverge from one another so as to be capable of simultaneous registration respectively with the opening of the outlet nozzles 10, and 11.

A vertical passage 5, is formed through the lower portion of the casing in proper position to communicate with the passage 3, leading from the receptacle 1. In cross section the passage 5, is oval, its two diametrical dimensions being indicated respectively in Figs. II, and IV, and its greatest diameter being such as to register with the approximately oval opening in the valve 7, at the region where the passages 8, and 9, merge together.

Intermediate between the passage 5, and the passage 3, are two independent controlling elements, which in this instance, are arranged to move at right angles to one another. The lower of these elements is the slide 17, shown in perspective in Fig. VI, and which may conveniently be termed the outlet-slide. This outlet-slide moves freely in a horizontal channel formed in the bed plate 2, the width of the slide being such as to completely cover the upper end of the passage 3. This outlet-slide is provided with a stud 18, so that it may be shifted by hand into any desired position and in this instance, it contains three triangular openings 19, 20, and 21, the altitude of the three triangles being the same, but the base lines varying, so that the area of the triangle 19, is one-half that of the triangle 21, the area of the latter one-half that of the triangle 20. When the outlet slide is adjusted with any one of these three triangles symmetrically over the center of the passage 3, the effective area of the outlet of said passage is of course reduced to the area of the particular triangle so located. Transverse lines 22, 23, and 24, are so marked upon the outlet-slide as to register with the exterior face of the

casing 4, when the respective triangles are in the proper position with reference to the passage, so that the operator may correctly adjust the slide.

Immediately above the outlet-slide 17, and preferably at right angles thereto is a second slide 26, which may conveniently be termed the cut-off slide. This cut-off slide moves freely in an undercut recess 25, formed in the lower portion of the casing 4, and is provided with a laterally projecting rack 27, which extends out through the casing 4, and is mounted within a removable housing comprising the pieces 35, and 36, which are secured to the laterally extending part of the bed plate 2, at that region. Said housing affords bearings for the shaft 29, upon which a pinion 28, is mounted in engagement with the rack 27, the shaft 29, being provided with an external hand wheel 30, whose periphery is marked with graduations as indicated. The cut-off slide 26, is of such dimensions and its range of movement of such extent, as to permit the complete covering of any given opening through the outlet-slide 17, or the complete exposure of said opening when arranged in communication with the passage 3. The inner end of the cut-off slide 26, is in this instance, rectangular with relation to its sides, in order that it may be symmetrical with relation to the configuration of the openings in the outlet-slide 17, so that as the cut-off slide 26, is progressively advanced or withdrawn across that opening which is then beneath it, a definite and regular reduction or increase in the area of the opening shall be effected.

A radial arm 44, having an index 45, arranged to overhang the periphery of the hand wheel 30, is mounted in a convenient position for observation from what may be termed the front of the instrument, that is to say, the side which in Fig. I, is shown at the bottom of the sheet. The exterior face of the valve 7, is also marked as indicated in Fig. V, with the radial lines 40, 41, and 42, which correspond with the three required positions of said valve, a mark 43, upon the exterior of the casing being properly located for registration with said lines respectively in the several rotative positions of the valve 7, within the casing 4.

A pedestal 47, may be provided for the sound emitting object 48, which may be a watch, and said pedestal may conveniently rest upon a mat of felt 46, or other substance which is not a good conductor of sound, so as to deaden the vibrations which might otherwise be directly communicated to the base of the instrument.

Referring to Fig. I, a pair of stethoscope tubes 50, and 51, are shown as connected respectively with the nozzles 10, and 11, said tubes being provided with the usual tips 52, and 53, for insertion into the cavity of the external ear.

The operation of the device is as follows:—The outlet-slide 17, is arranged with either one of its openings over the center of the passage way 3. In the instance shown, the largest opening 20, is thus indicated. The cut-off slide 26, is withdrawn, so as to completely expose the area of said opening, the position when the withdrawal is just complete being indicated by some predetermined mark, of the graduated scale upon the hand wheel 30. The valve 7, is adjusted by means of the hand wheel 13, into the desired position. In the instance shown in Fig. IV, this position is one in which

the passages 8, and 9, are both in communication with the passage 5, and respectively in communication with the nozzles 10, and 11, and stethoscope tubes 50, and 51. The tips of the tubes 50, and 51, are placed in the ears of the person subjected to the test and the hand wheel 30, is then turned so as to shift the cut-off slide 26, progressively across the opening 20, thus symmetrically reducing the area of said opening, the movement being continued until the sound just ceases to be audible by such person. The extent of rotative movement of the hand wheel 30, is then noted by means of the graduated scale, and the acuteness of simultaneous hearing by both ears may thus be recorded. By reverse movement of the hand wheel the cut-off slide may be actuated from an alternative position, when the opening is closed, so as to gradually increase the area of the opening until sound is just perceptible.

The valve 7, may be turned into such a position that only one of the openings 8, or 9, shall be in communication with the passage 5, and as the sound will then only be transmitted through the stethoscope tube which is in communication with the passage 5, the hearing of one ear may be tested independently of the other ear, the reduction of the area of the opening 20, by means of the cut-off slide 26, being effected as above. If for any reason it is desired to employ an opening of less area than the opening 20, for the purpose of comparative test, either of the openings 19, or 20, may be substituted for said opening by merely shifting the outlet-slide 17, into one of its positions of proper registration. In such case the symmetrical reduction or increase of the size of the opening can be effected by means of the cut-off slide 26, as before.

Any predetermined standard may be adopted as the basis for the comparisons indicated by the graduated scale of the hand wheel 30, since of course, the functions of the instrument itself are not dependent upon the nature of the method by which they may be ultimately utilized.

It is of course obvious that the structural details above described may be varied without affecting the underlying principle of construction and operation, and also that while the complete embodiment above set forth is desirable, certain features may be omitted without losing the broader or more general advantages. I therefore wish it to be understood that I do not limit my claims to said structural details nor to the inclusion of all the operative features as a whole.

I claim:—

1. In an audiometer, the combination with a receptacle provided with an aperture; of a sound remitting object inclosed in said receptacle; and means for progressively and definitely varying the area of said aperture for testing the acuteness of human hearing.

2. In an audiometer, the combination of a receptacle adapted to inclose a sound emitting object, said receptacle being provided with an aperture; and means for progressively and definitely varying the area of said aperture and for indicating the extent thereof at a given movement.

3. In an audiometer, the combination of a receptacle adapted to inclose a sound emitting object; means for providing said receptacle with apertures of selected area; and means for progressively varying the area of one of said apertures and for indicating the extent thereof at a given movement.

4. In an audiometer, the combination of a receptacle adapted to inclose a sound emitting object; an outlet slide

provided with an aperture; and means for progressively varying the area of said aperture.

5. In an audiometer, the combination of a receptacle adapted to inclose a sound emitting object; an outlet slide provided with a series of apertures of selected area and adapted to be progressed to present one of said apertures as an outlet for sound from said receptacle; and means for progressively varying the area of said presented aperture and for indicating the extent thereof at a given movement.

6. In an audiometer, the combination of a receptacle adapted to inclose a sound emitting object; said receptacle being provided with an aperture; a cut-off slide for progressively varying the area of said aperture; and means whereby either or both ears of a person undergoing the test may be placed in communication with the source of sound.

7. In an audiometer, the combination of a receptacle adapted to inclose a sound emitting object, said receptacle being provided with an aperture; a cut-off slide for progressively varying the area of said aperture; means for indicating the extent of movement of said slide; tubes for application to the ears of the person undergoing the test; and a valve for establishing communication between said aperture and either or both of said tubes.

8. In an audiometer, the combination of a receptacle adapted to inclose a sound emitting object, said receptacle being provided with an aperture; a cut-off slide for progressively varying the area of said aperture; a casing secured to said receptacle; a pair of nozzles attached to said casing; a passage in said casing; and a valve for placing said passage in communication with either or both of said nozzles.

9. In an audiometer, the combination of a receptacle adapted to inclose a sound emitting object; an outlet slide provided with an aperture; a casing attached to said receptacle and having a passage adapted to be placed in com-

munication with the interior of said receptacle; a pair of nozzles in said casing; and a valve in said casing whereby either or both of said nozzles may be placed in communication with said passage.

10. In an audiometer, the combination of a receptacle adapted to inclose a sound emitting object, said receptacle being provided with an aperture; a casing having a passage adapted to be placed in communication with said aperture; a cut-off slide for varying the extent of said aperture; a rack upon said slide; a shaft; a pinion upon said shaft and adapted to mesh with said rack; means for turning said shaft; a pair of nozzles in said casing; and a valve for placing said passage in communication with either or both of said nozzles.

11. In an audiometer, the combination with a receptacle; of an object which creates sound waves inclosed within said receptacle; means for transmitting a definite portion of said sound waves to the ear; and means for progressively varying the extent of the portion of the sound waves thus transmitted, for testing the acuteness of human hearing.

12. The combination with means for creating sound waves; of an inclosure containing an aperture for transmitting a definite portion of said sound waves to the ear; and means for definitely varying the extent of the transmitted sound waves by uniformly progressive modifications of the area of said aperture, whereby the acuteness of human hearing may be tested.

In testimony whereof, I have hereunto signed my name, at Philadelphia, Pennsylvania, this twenty-third day of February, 1907.

JOSEPH M. MCCALLIE.

Witnesses:

JAMES H. BELL,
E. L. FULLERTON.

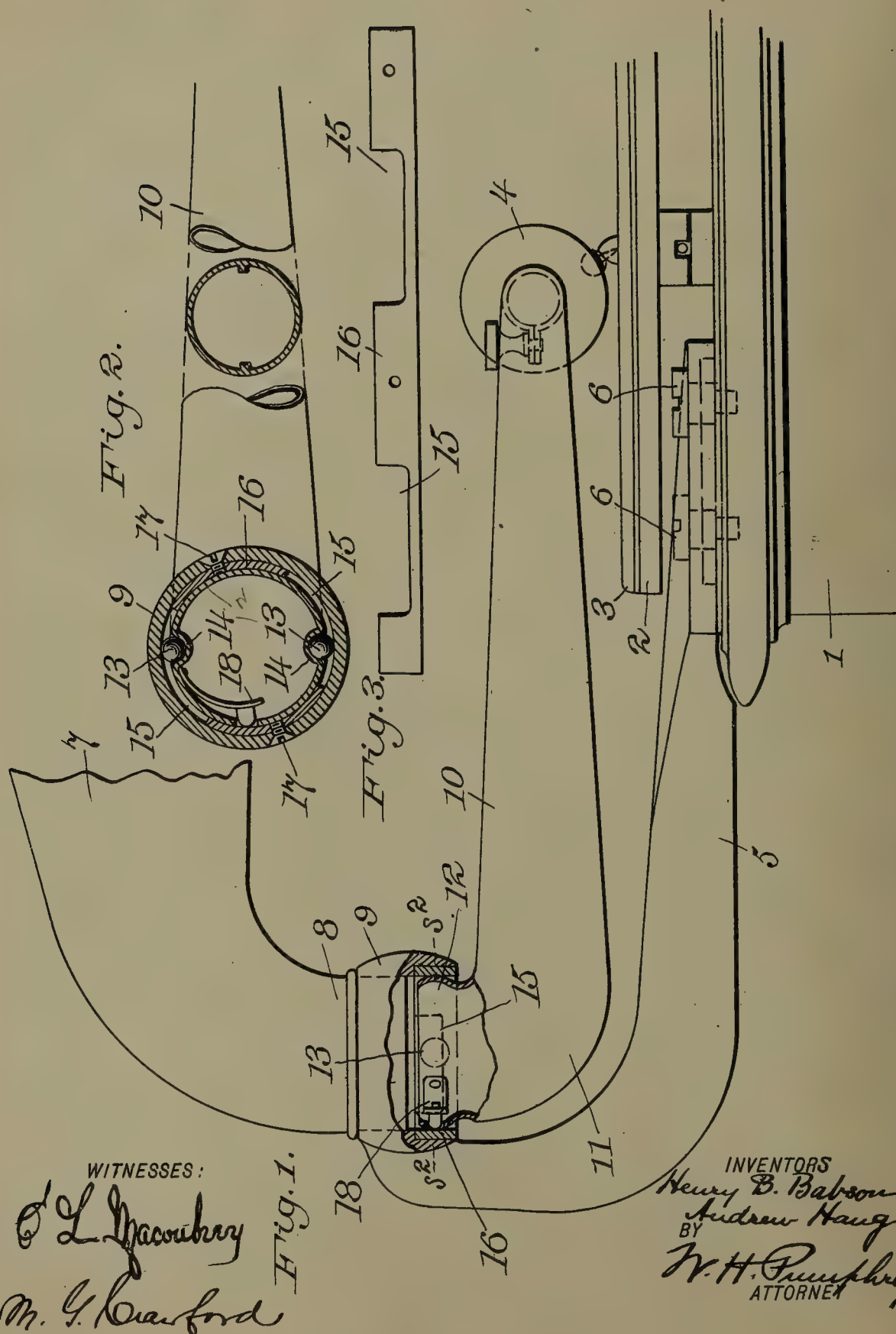
No. 863,135.

PATENTED AUG. 13, 1907.

H. B. BABSON & A. HAUG.

TALKING MACHINE.

APPLICATION FILED DEC. 15, 1906.



WITNESSES:

O. L. Macomber
M. G. Crawford

Fig. 1.

INVENTORS

Henry B. Babson
Andrew Haug

BY

W. H. Humphrey
ATTORNEY

UNITED STATES PATENT OFFICE.

HENRY B. BABSON AND ANDREW HAUG, OF NEW YORK, N. Y., ASSIGNORS TO UNIVERSAL TALKING MACHINE MANUFACTURING COMPANY, A CORPORATION OF NEW YORK.

TALKING-MACHINE.

No. 863,135.

Specification of Letters Patent.

Patented Aug. 13, 1907.

Application filed December 15, 1906. Serial No. 348,026.

To all whom it may concern:

Be it known that we, HENRY B. BABSON and ANDREW HAUG, citizens of the United States, residing at New York, county and State of New York, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

Our invention relates generally to talking machines and particularly to supporting means for the sound reproducer thereof.

10 An important feature of our invention consists in mounting the sound reproducer in suspended relation on ball or roller bearings so arranged, as to permit free movement thereof only in planes at right angles to each other.

15 In the present embodiment of the invention, the reproducer is preferably mounted upon ball-bearings and is free to move vertically and horizontally in accordance with the requirements of the type of machine to which it is applied.

20 The accompanying drawings will serve to illustrate mechanism suitable for carrying our invention into effect. We wish it understood, however, that we do not limit ourselves to the exact construction and arrangement of parts shown, as various changes may be made therein or other means employed operating in substantially the same manner to produce practically the same result.

In the drawings: Figure 1, is a view in side elevation, partly in section, illustrating the application of our invention to a well-known type of talking machine. Fig. 2, is a horizontal sectional view thereof, on the line s^2 , s^2 , of Fig. 1, and Fig. 3, is a detail view of the stamped out blank which is shown in Fig. 2, formed up to serve as a removable ring section of the horn supporting bracket.

35 Referring now to the drawings: 1, represents the casing of the machine, 2, the rotating table thereof, 3, the usual type of disk record upon the table, 4, the sound box or reproducer, 5, a rigid arm or bracket secured to the casing by screws 6, or otherwise, and 7, the horn, the small end 8 of which is removably fitted in a sleeve-like off-set or annular guide 9 of the bracket 5, the arrangement being such as to permit the horn to be swung around to any position desired.

45 Interposed between and operatively connecting the reproducer or sound box and the horn, there is a tubular sound conveyer 10, known generally as a taper arm.

The reproducer is secured to one end of the arm, which forms a continuation of the sound chamber thereof. The arm 10, may be cast, drawn, stamped up from sheet metal or otherwise formed and terminates at the end opposite the reproducer in an elbow 11, which is provided with a shaped portion 12 fitted in the bore of the sleeve or annular guide 9 of the horn supporting bracket. As arranged, the co-acting bearing surfaces of the arm and guide are tangentially disposed relatively to each other, permitting free vertical and horizontal movement of the arm with a minimum amount of friction. The arm is supported in suspended relation in the guide upon ball bearings 13, which are diametrically disposed and coöperate with the guide to limit the arm to movement in planes at right angles to each other or as shown, to vertical and horizontal movement only, thus maintaining the reproducer in proper position relatively to the record. The arm is provided with semi-spherical indentations, or other suitably formed recesses, slots, or the like, as indicated at 14, to receive the balls, which project outwardly therefrom in opposite directions and enter slots or recesses 15 of the guide. The length of the arc through which the arm is movable horizontally is determined by the length of the slots 15 and may, therefore, be varied as required.

For convenience in assembling the parts, the annular guide for the arm is preferably formed as a removable ring section 16 of the bracket 5, which latter is counterbored to receive the same. This ring section may be blanked out, as shown in Fig. 3, and subsequently formed up, or it may be cast or otherwise produced, and secured in position by screws 17, or other suitable means.

A spring locking device 18, such as that shown or of any other suitable form, may be employed to yieldingly hold the reproducer elevated above and clear of the record when the machine is not in use.

The operation, advantages, etc., of our invention will be apparent from the foregoing description.

Having thus described our invention, we claim:

1. A support for a sound reproducer comprising an annular slotted guide, a tubular arm forming a continuation of the reproducer and terminating within the guide, and balls in the slots serving as bearings upon which the arm is free to swing vertically and horizontally.

2. A support for a sound reproducer comprising an arm forming a continuation of the reproducer, and bearings on

which the arm is free to swing vertically and horizontally, said bearings being movable with the arm and free to rotate independently thereof.

- 5 3. A support for a sound reproducer comprising an arm forming a continuation of the reproducer, bearings on which the arm is free to swing vertically and horizontally, said bearings being movable with the arm and rotatable independently thereof, and a locking device for limiting the movement of the arm.
- 10 4. A support for a sound reproducer comprising a sectional annular guide, one member of which is slotted, a

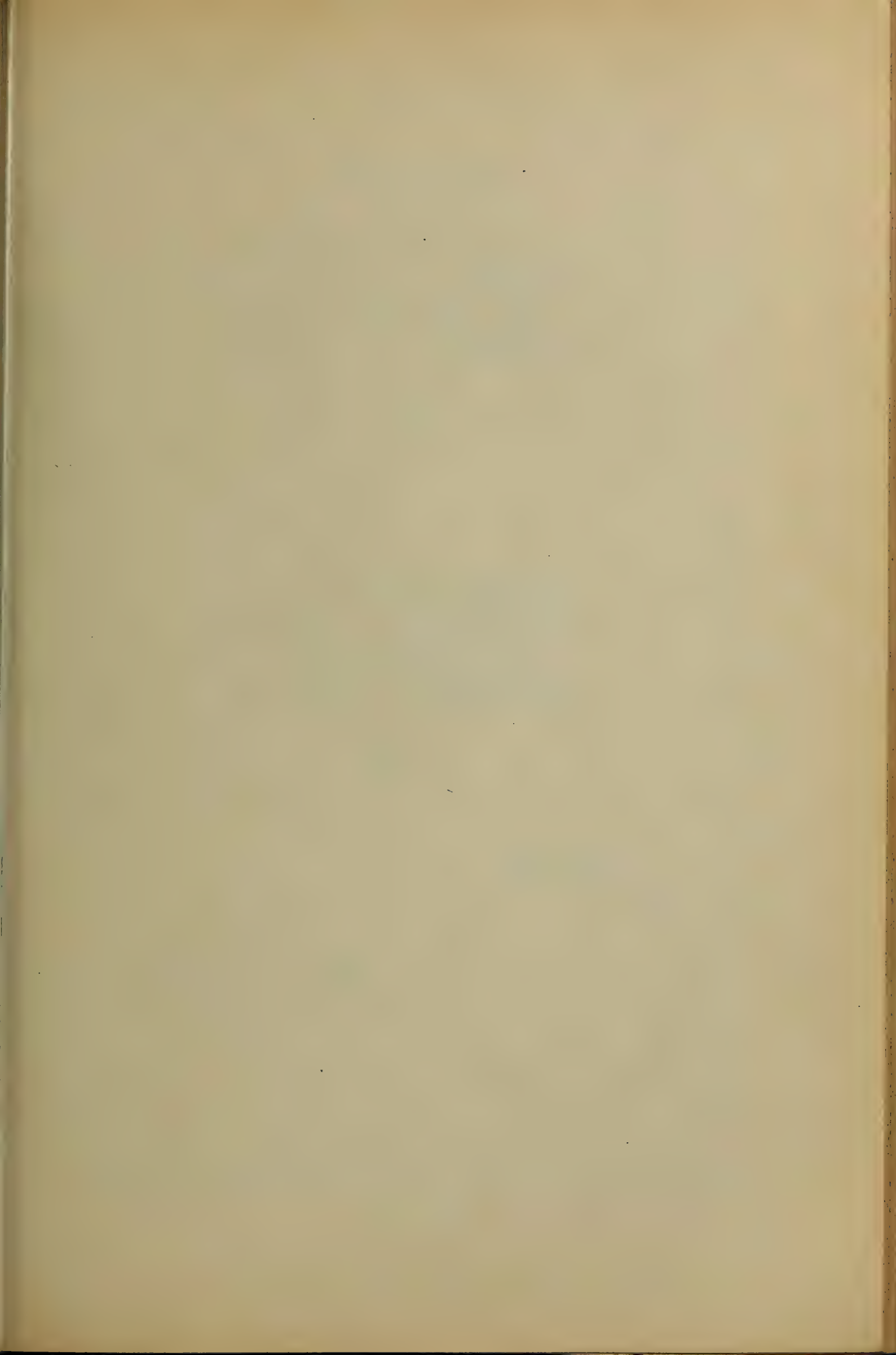
tubular arm forming a continuation of the reproducer and terminating within the guide, and balls in the slots serving as bearings on which the arm is free to swing vertically and horizontally.

In testimony whereof we affix our signatures, in the presence of two witnesses.

HENRY B. BABSON.
ANDREW HAUG.

Witnesses :

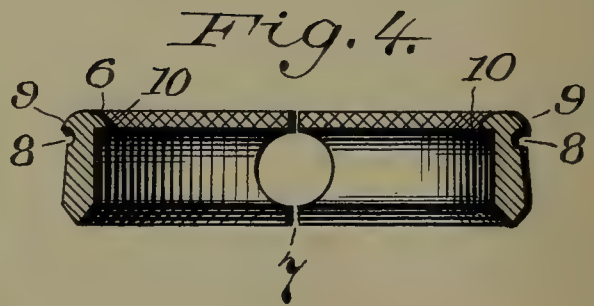
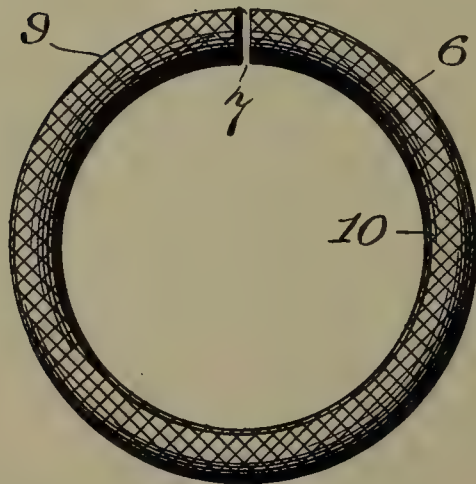
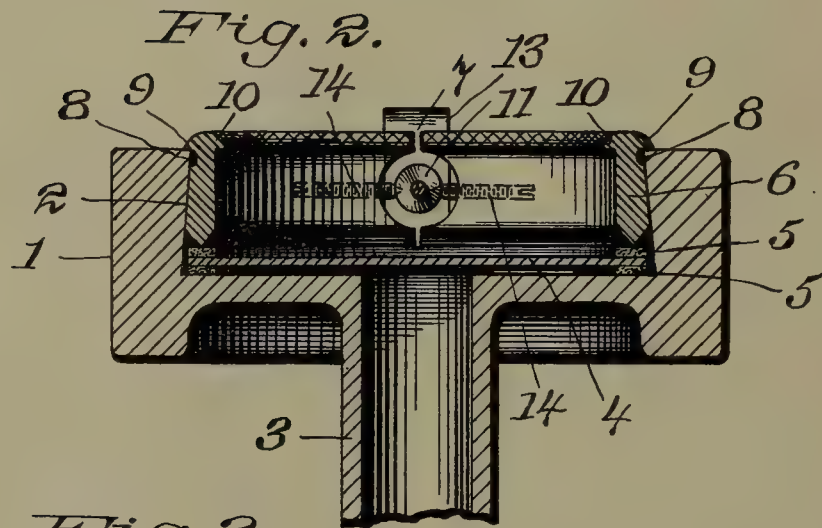
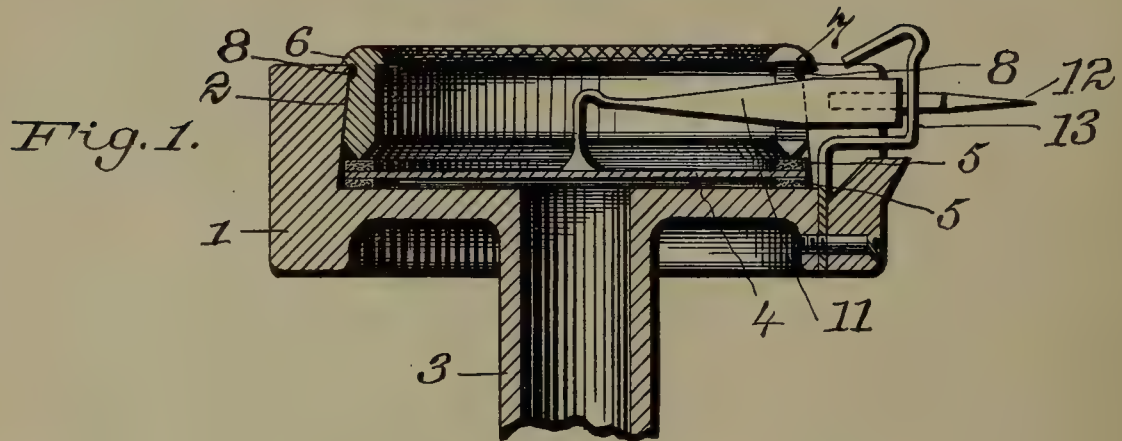
W. H. PUMPHREY,
M. G. CRAWFORD.



No. 863,174.

PATENTED AUG. 13, 1907.

A. HAUG.
SOUND REPRODUCER.
APPLICATION FILED AUG. 3, 1905.



Witnesses
Frank Connor
L. Barnett

Inventor
Andrew Haug.
By his Attorney
W. H. Humphrey

UNITED STATES PATENT OFFICE.

ANDREW HAUG, OF NEW YORK, N. Y., ASSIGNOR TO UNIVERSAL TALKING MACHINE MANUFACTURING COMPANY, A CORPORATION OF NEW YORK.

SOUND-REPRODUCER.

No. 863,174.

Specification of Letters Patent.

Patented Aug. 13, 1907.

Application filed August 3, 1905. Serial No. 272,451.

To all whom it may concern:

Be it known that I, ANDREW HAUG, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Sound-Reproducers, of which the following is a specification.

My invention relates generally to talking machines and particularly to the construction of the sound box or reproducer used in connection therewith.

10 An important feature of the invention consists in providing for assembling the various parts of the reproducer from the front of the casing and in so simplifying the construction, as to enable the average user to remove parts, make any necessary adjustment or repair
15 and reassemble the same in a ready and convenient manner without requiring the aid of a skilled workman.

A reproducer constructed in accordance with my invention is illustrated in the accompanying drawings. I wish it understood, however, that I do not limit myself to the exact form or arrangement of parts shown,
20 as various changes may be made therein without departing from the spirit and scope of my invention.

In the drawings—Figure 1 is a sectional view of the reproducer. Fig. 2 is a similar view, taken at right
25 angles to the plane of Fig. 1. Fig. 3 is a detail plan view of the split spring ring which locks the diaphragm in the casing, and Fig. 4 is a sectional view thereof.

Referring now to the drawings, 1 represents a sectional casing of the reproducer or sound box, one member of which is recessed to provide a cylindrical chamber 2 therein and leading outward from the same, there is the usual tubular extension 3, for connection with the horn.

A diaphragm 4, mounted in the chamber 2, is held
35 between washers or gaskets 5, 5, preferably of felt, the peculiar cushioning effect of which is, such as to cause the ordinary mica diaphragm to reproduce with marked clearness and greatly improved tone quality, as compared to the results obtained by the use of rubber.
40 The employment of felt gives rise to many other important advantages. It is comparatively inexpensive, is readily obtained in any quantity desired, may be kept in stock indefinitely without deteriorating and is durable and highly effective in use.

45 It will be observed, that the wall of the chamber 2 is given a slight taper, being somewhat larger at the bottom than at the top and fitted to telescope therein, there is a ring 6, forming the removable section or member of the casing. The ring 6 is split at 7, and
50 provided with a peripheral groove 8, or otherwise formed to give it requisite spring action to interlock with the member 1. The ring is given a taper similar to that of the wall of chamber 2 and is provided at the top with an outer flange 9, which seats against the
55 member 1 and an inner flange 10, for a tool hold, when

the ring is to be removed. The lower edge of the ring is reduced to a V, in cross section and rests upon the diaphragm or upon the felt gasket, when one is used upon the outer side thereof. The readiness and convenience with which the ring may be sprung into position or removed from the casing, will be at once apparent.

The construction and arrangement of the stylus arm 11, stylus 12, and spring locking device 13 coöperating therewith, are fully described in detail in my pending
65 application filed August 8, 1905, and serially numbered 272,450 and I will therefore give but a general description herein of the same.

As shown in Fig. 2, the stylus arm 11, is pivotally mounted between the cone points of two screws 14, 14,
70 and is connected at one end with the diaphragm in the usual manner. At the opposite end, the arm is socketed to receive the stylus or needle 12, which is detachably held therein by a friction device in the form of a spring 13, provided with a V-opening (not
75 shown) through which the needle projects. The removal of the needle is effected by simply depressing the spring and to insert a needle, the spring is similarly depressed to bring the V-opening thereof in line with the socket in the stylus arm. It will be understood that the present invention is not limited to the use of a particular form of stylus arm, locking device for the stylus etc., that shown being employed herein merely for purposes of completing an operative illustration.
85

Having therefore described my invention, I claim,

1. A casing for a sound reproducer comprising a member recessed to provide a seat for a diaphragm, and a contacting resilient member having an exterior bearing relative to the recess and an annular taper bearing interiorly thereof.
90

2. A casing for a sound reproducer comprising a member recessed to provide a seat for a diaphragm, and a contacting resilient member having an annular taper bearing interiorly of the recess and a stop flange exteriorly thereof.
95

3. A casing for a sound reproducer comprising a member recessed to provide a seat for a diaphragm, and a contacting resilient member having a bearing interiorly and exteriorly of the recess.
100

4. A casing for a sound reproducer comprising a member recessed to provide a seat for a diaphragm, and a contacting resilient member having an annular bearing interiorly and exteriorly of the recess.

5. A casing for a sound reproducer comprising a member recessed to provide a seat for a diaphragm, and a contacting resilient member arranged in telescoping relation thereto and having a bearing thereon exteriorly of the recess.
105

6. A casing for a sound reproducer comprising a member recessed to provide a seat for a diaphragm, and a split spring ring arranged in the recess in telescoping relation and provided exteriorly thereof with an annular flange.
110

7. A casing for a sound reproducer comprising a member recessed to provide a seat for a diaphragm, and a split spring ring arranged in the recess in telescoping relation and provided exteriorly thereof with oppositely disposed annular flanges.

5 8. A sound reproducer comprising two members arranged in telescoping relation, one member being self-maintaining by its own resilience relative to the other and having a bearing interiorly and exteriorly thereof, a diaphragm yieldingly held between the members, and a stylus operatively connected to the diaphragm.

10 9. A sound reproducer comprising a recessed member, a diaphragm mounted in the recess, a second member self-

maintaining by its own resilience in operative relation to the first member and exerting a yielding pressure upon the diaphragm throughout the circumference thereof, said second member being provided exteriorly of the recess with pressure limiting means, and a stylus connected to the diaphragm. 15

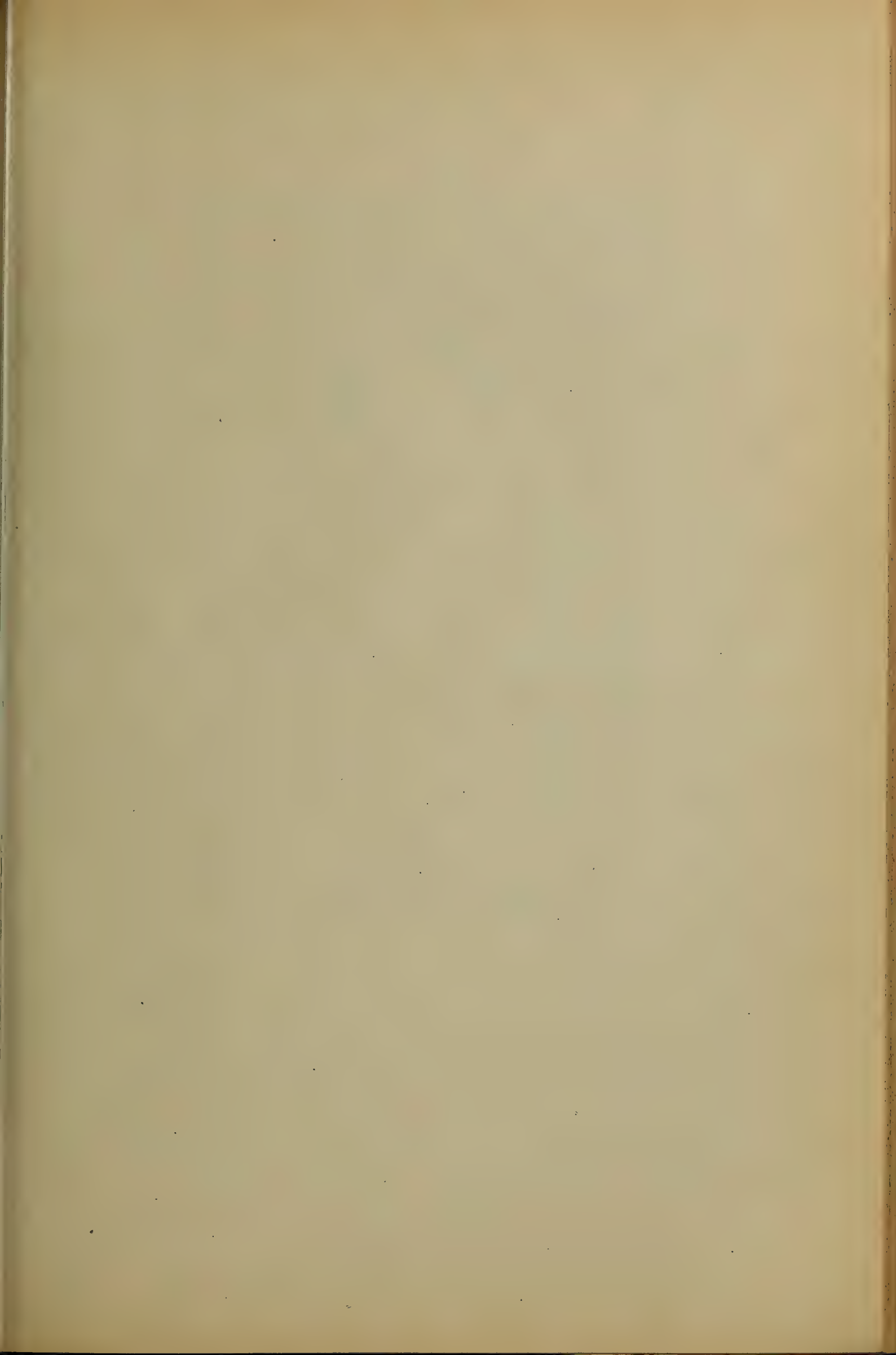
In testimony whereof, I affix my signature, in the presence of two witnesses. 20

ANDREW HAUG.

Witnesses:

W. H. PUMPHREY,

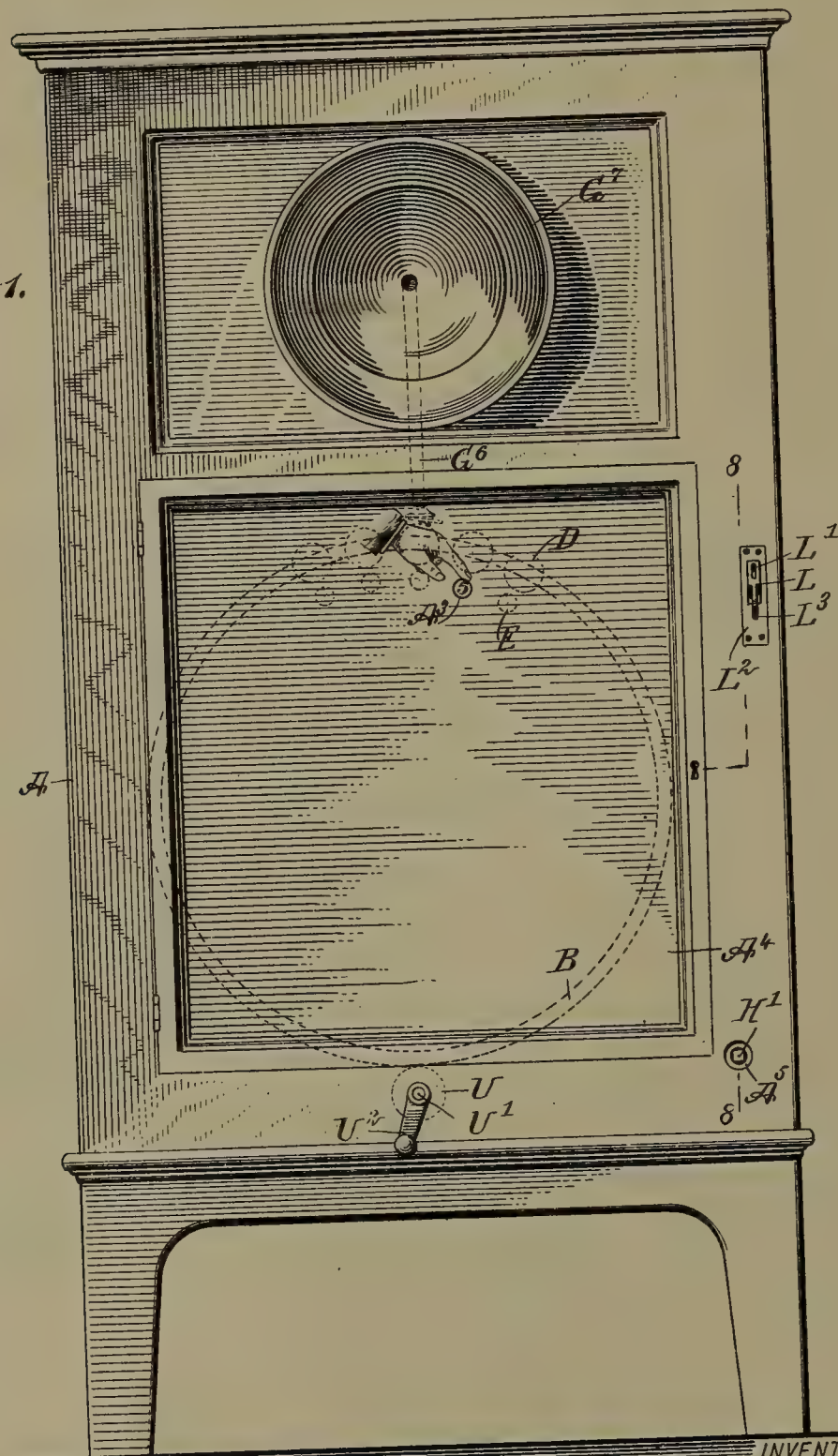
M. G. CRAWFORD.



A. A. PRATT.
MAGAZINE PHONOGRAPH.
APPLICATION FILED JAN. 17, 1906.

6 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

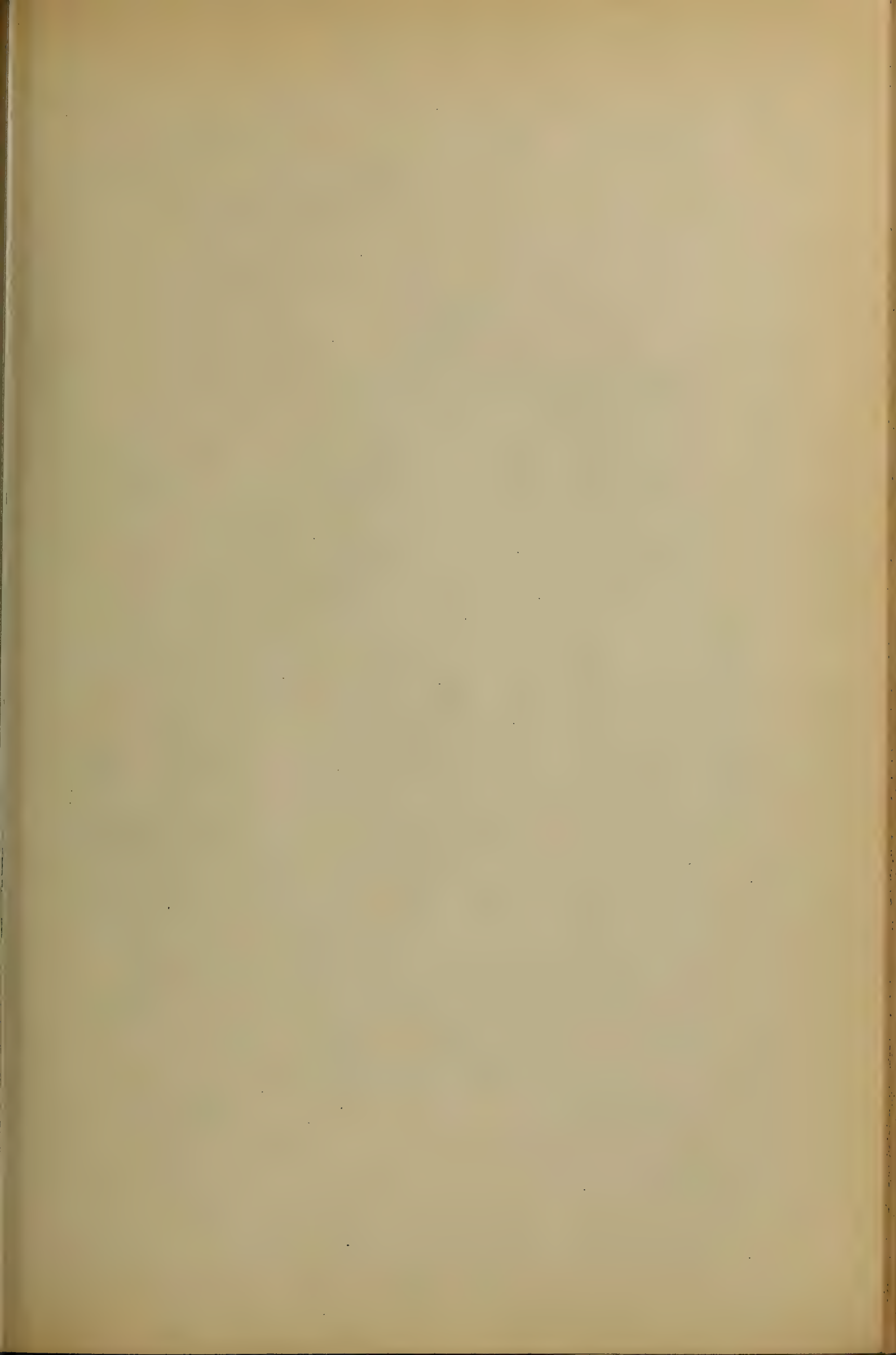
Geo. W. Maylor.
Rev. J. H. Hootch.

INVENTOR

Allison A. Pratt

BY

Munn & Co.
ATTORNEYS

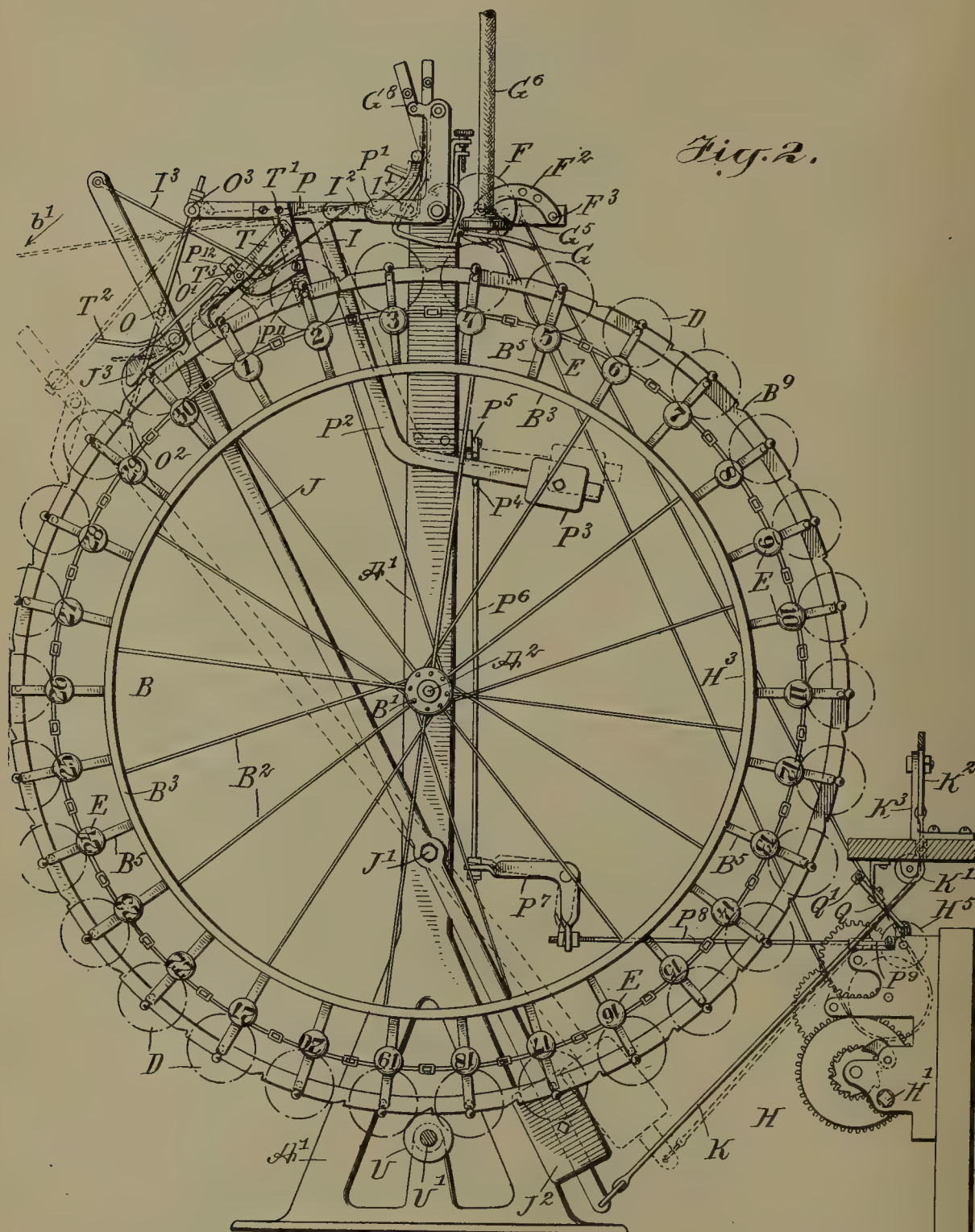


No. 864,686.

PATENTED AUG. 27, 1907.

A. A. PRATT.
MAGAZINE PHONOGRAPH.
APPLICATION FILED JAN. 17, 1906.

6 SHEETS—SHEET 2.



WITNESSES:

Geo. W. Maylor.
Rev. J. H. Hester.

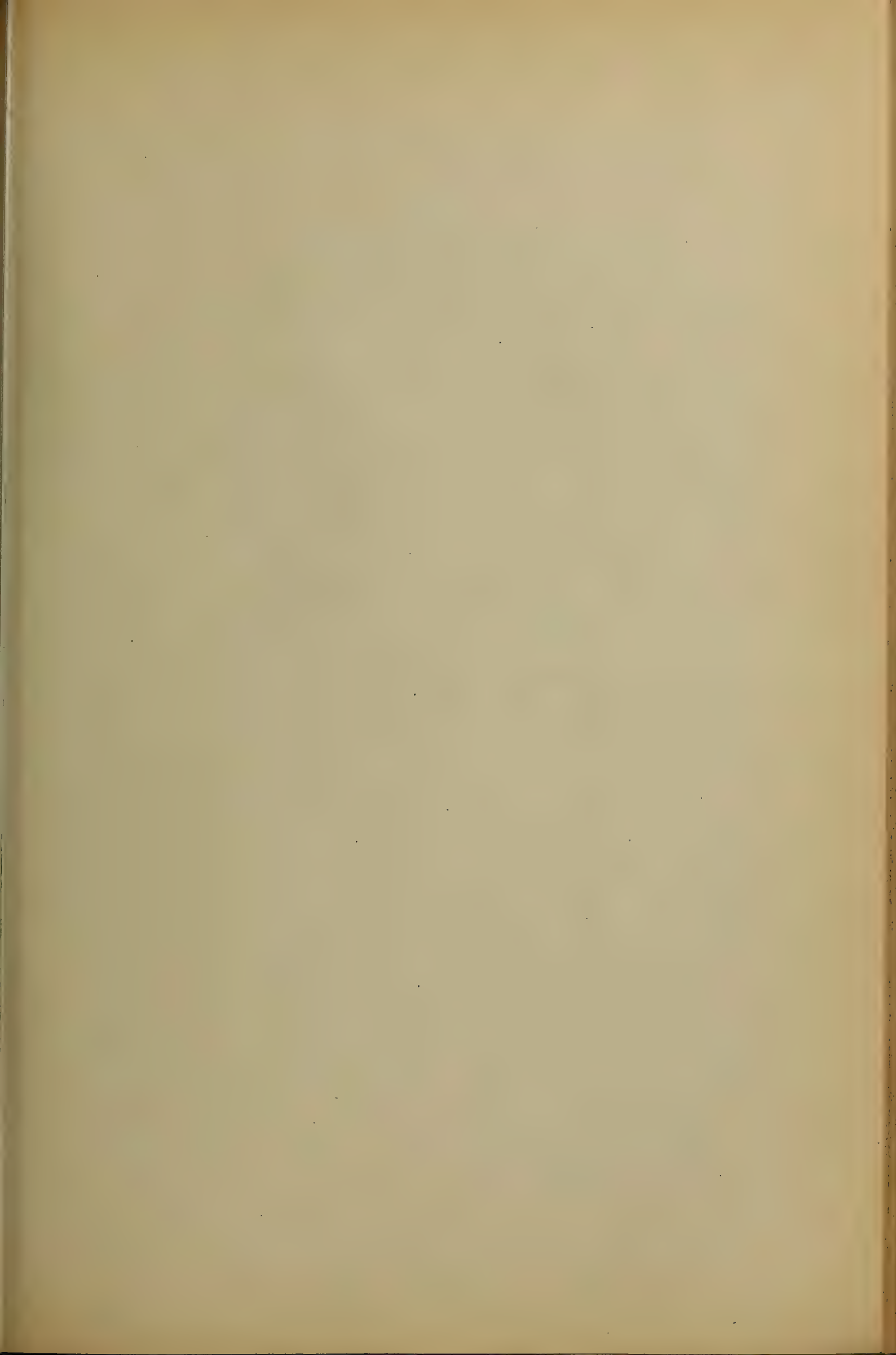
INVENTOR

Allison A. Pratt

BY

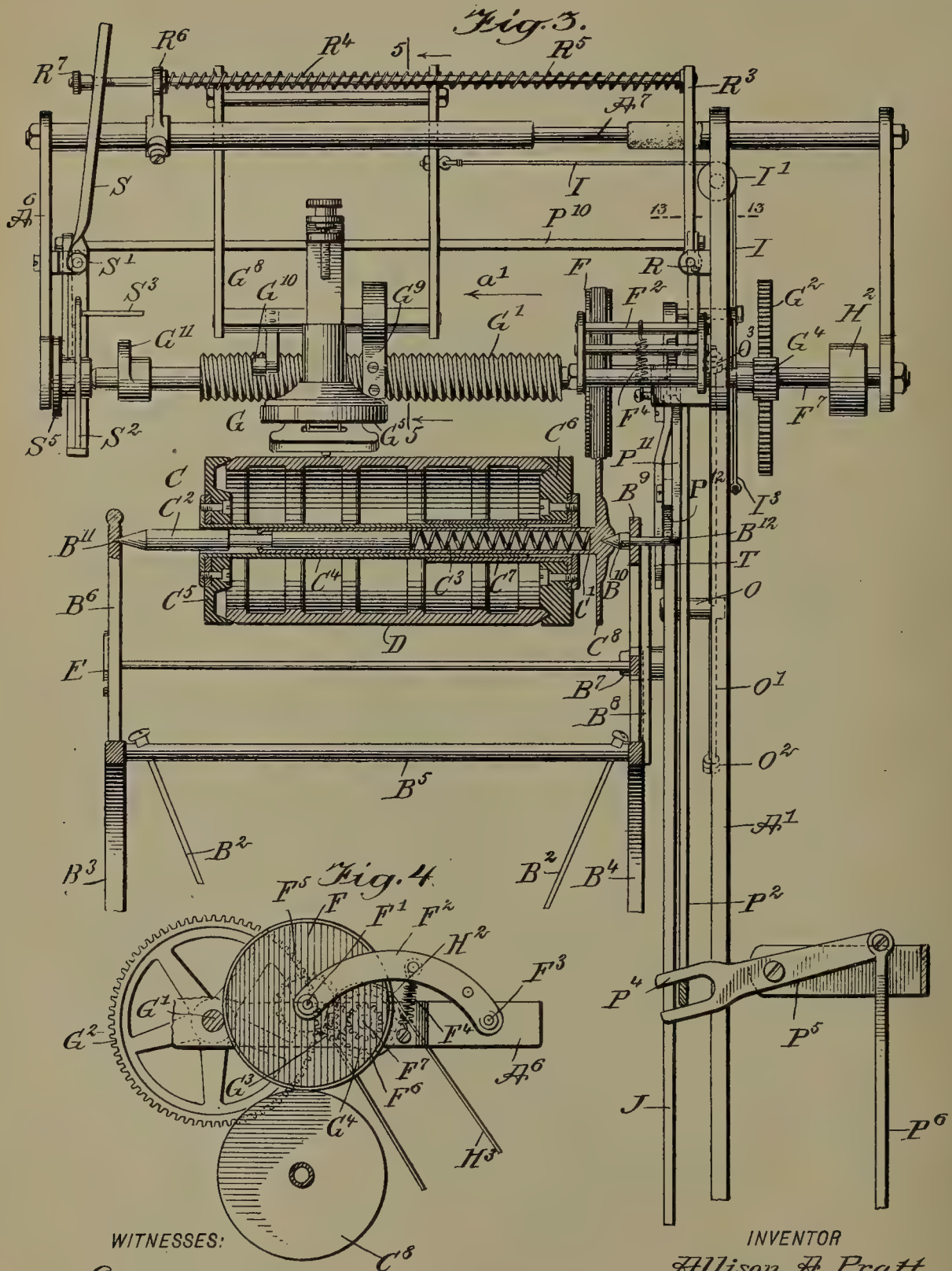
Mum & Co

ATTORNEYS



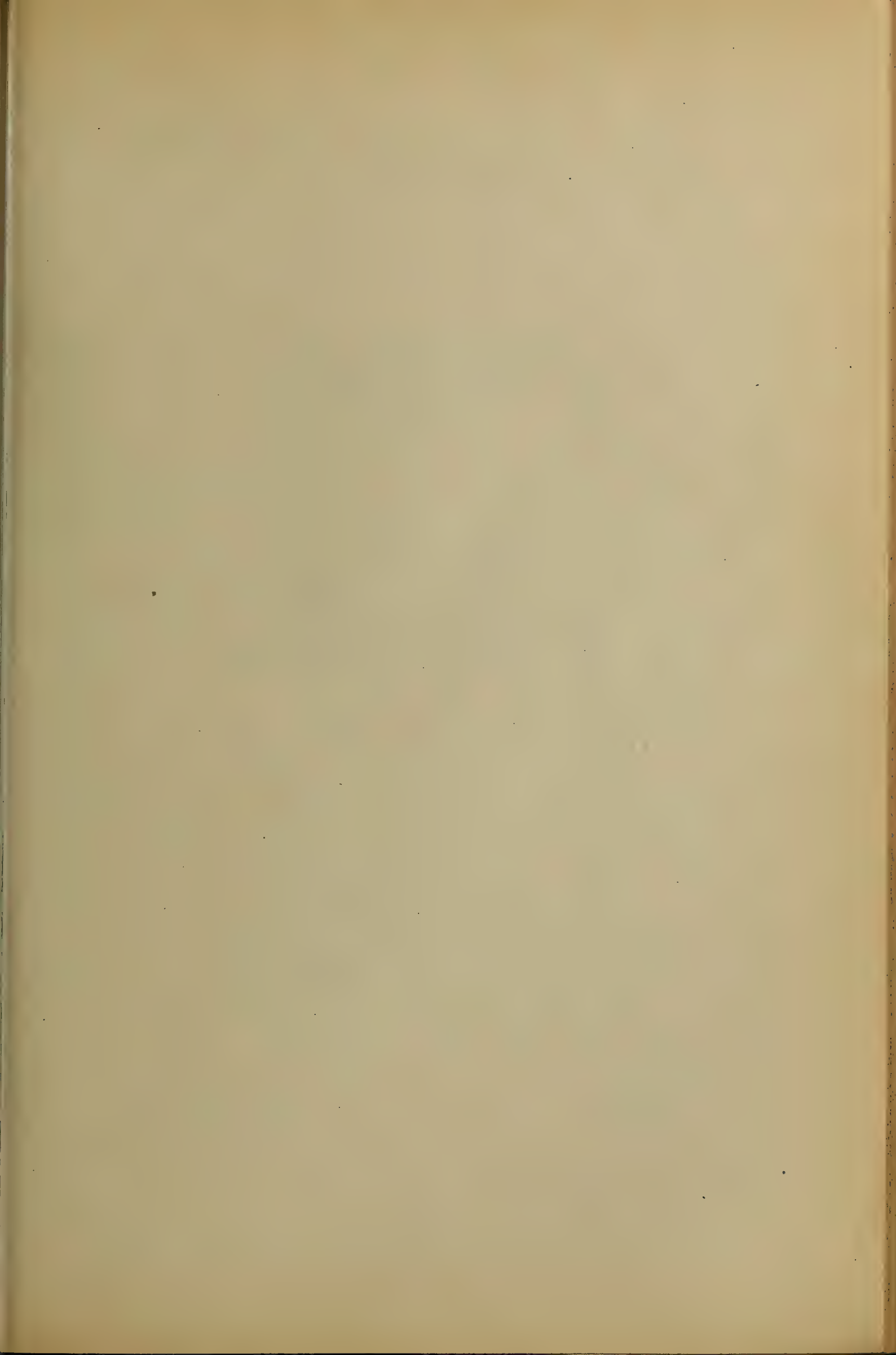
A. A. PRATT.
MAGAZINE PHONOGRAPH.
APPLICATION FILED JAN. 17, 1906.

6 SHEETS—SHEET 3.



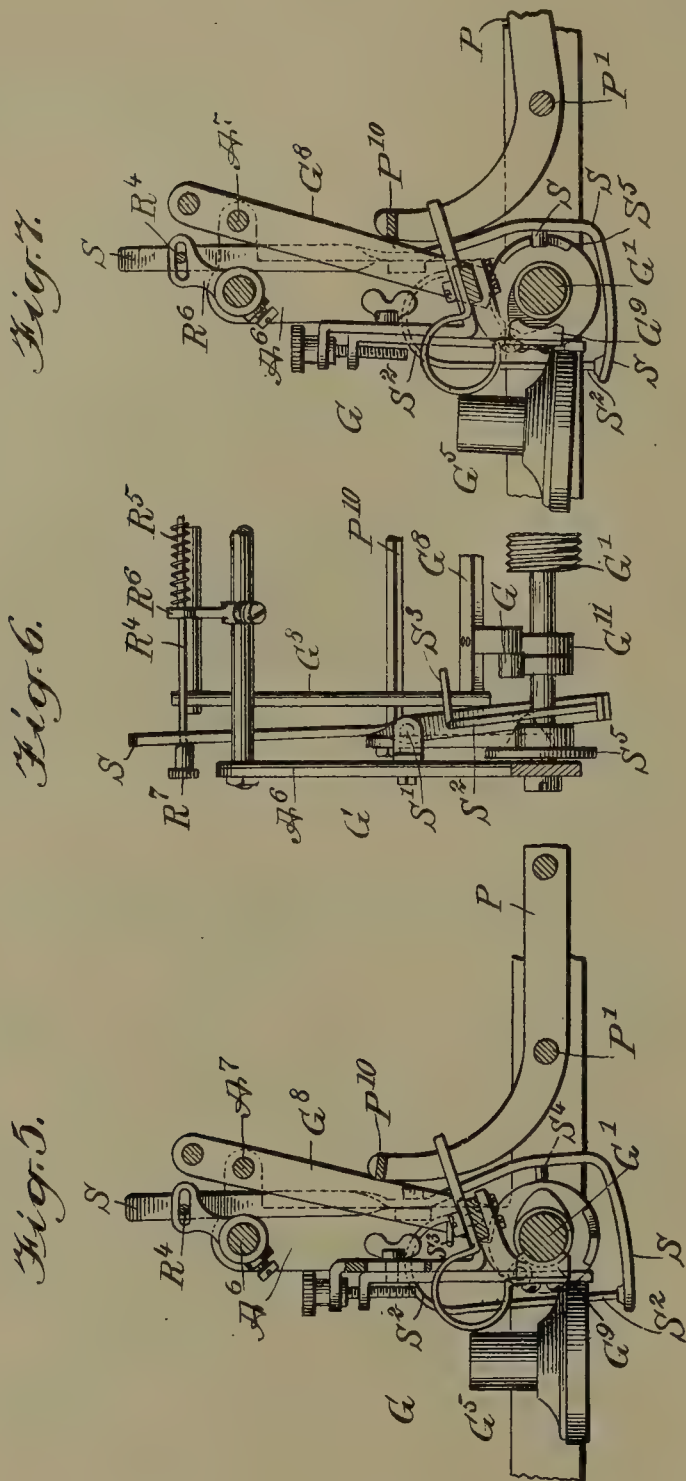
WITNESSES:
Geo. W. Maylor.
Rev. G. Hooper.

INVENTOR
Allison A. Pratt
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ATTORNEYS



A. A. PRATT.
MAGAZINE PHONOGRAPH.
APPLICATION FILED JAN. 17, 1906.

6 SHEETS—SHEET 4.



WITNESSES:

Geo. W. Maylor.
Rev. G. H. Hooker.

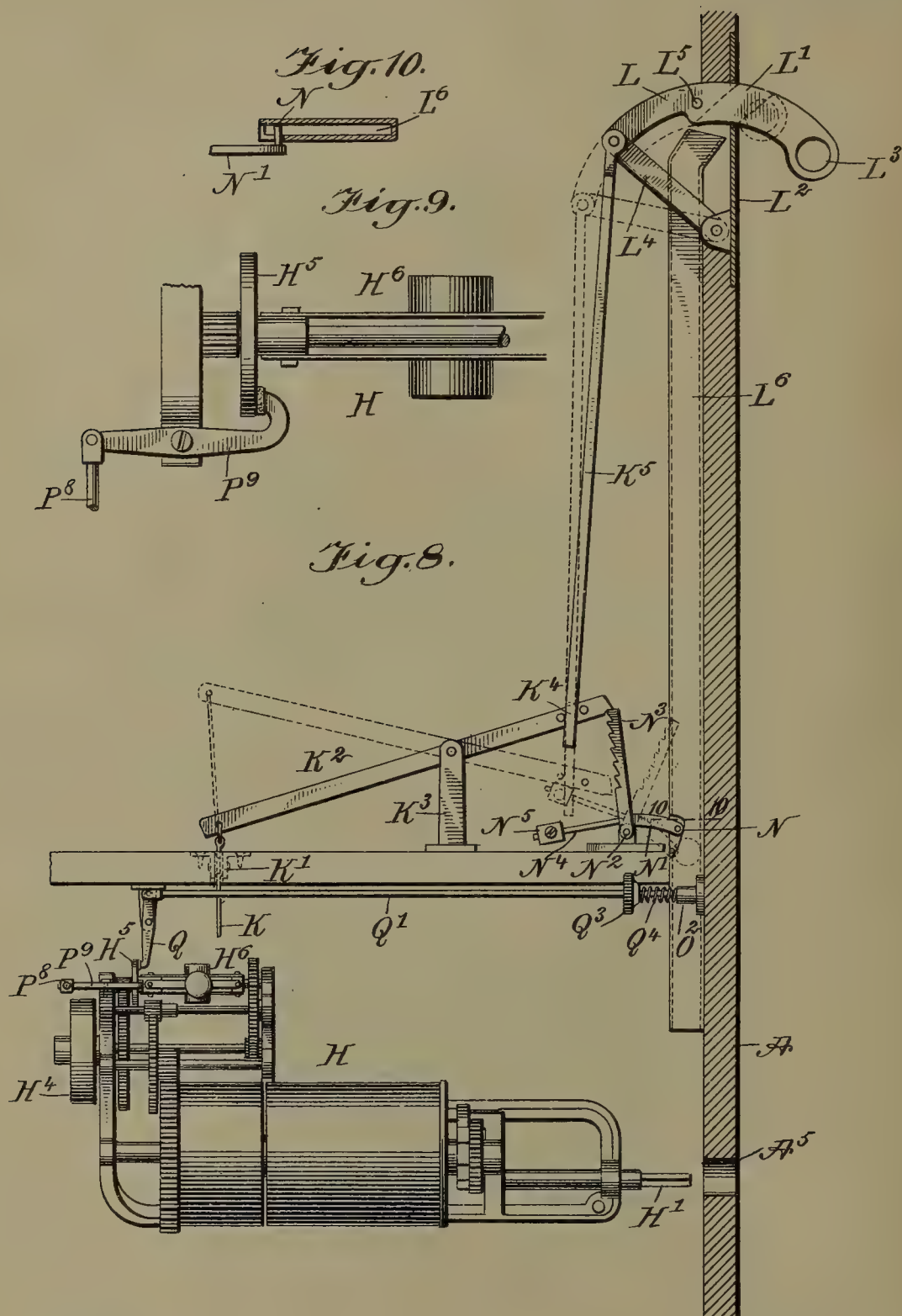
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No. 864,686.

PATENTED AUG. 27, 1907.

A. A. PRATT.
MAGAZINE PHONOGRAPH.
APPLICATION FILED JAN. 17, 1906.

6 SHEETS—SHEET 5.



WITNESSES:

Geo. W. Maylor.
Rev. J. H. Hester

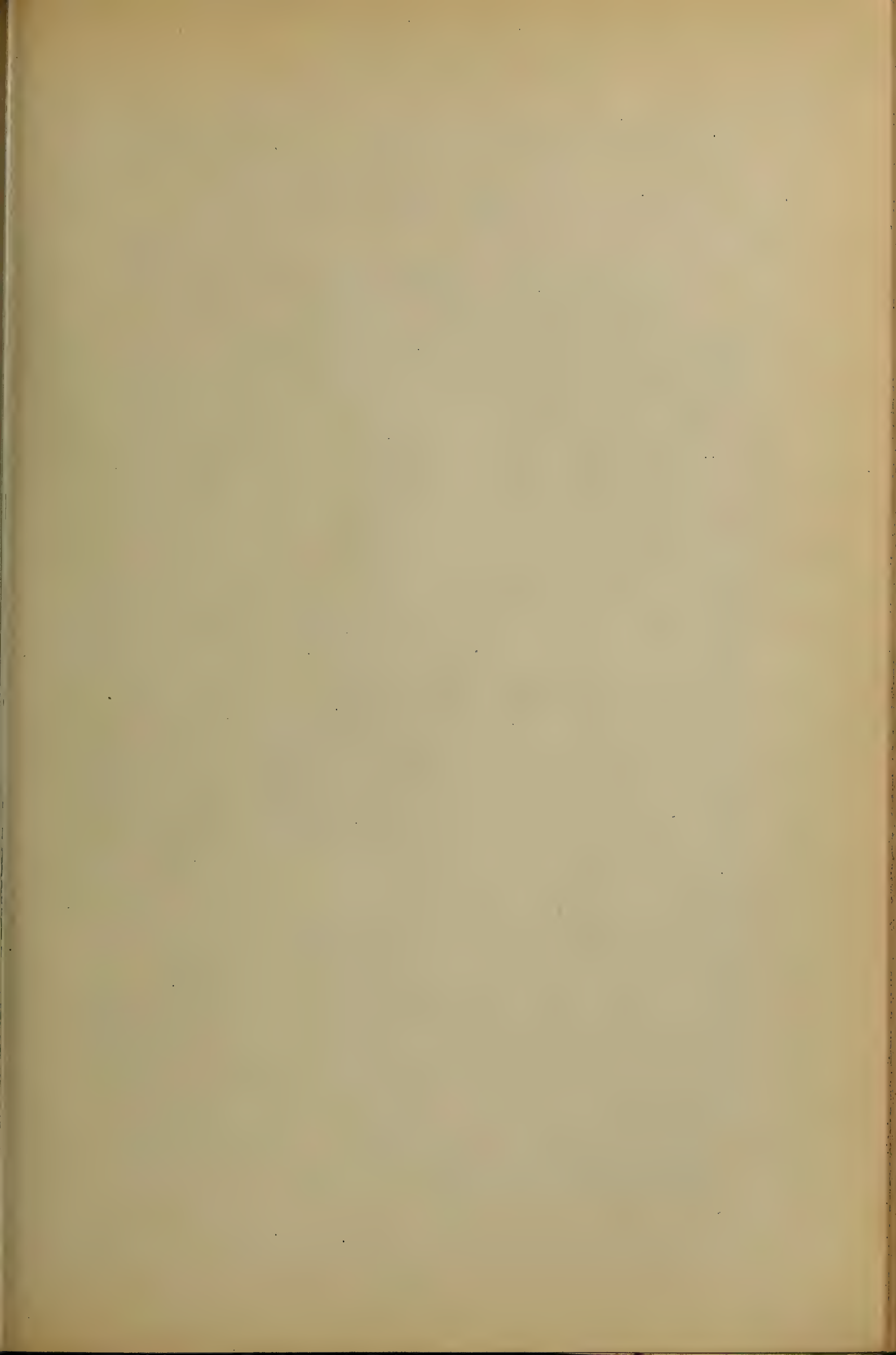
INVENTOR

Allison A. Pratt

BY

Mum & Co

ATTORNEYS

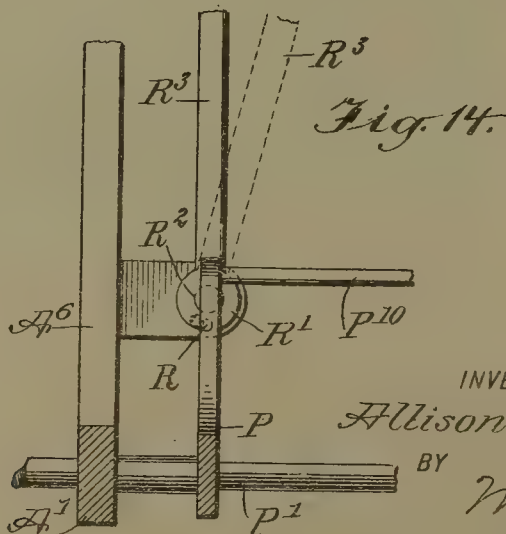
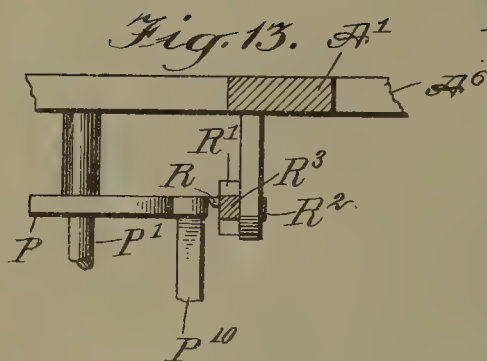
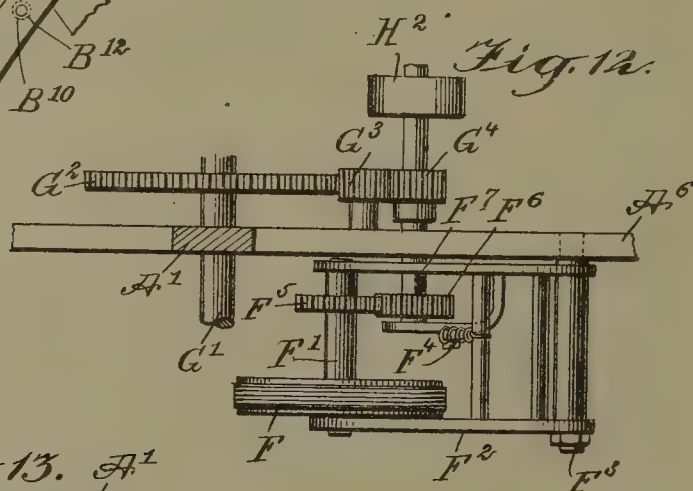
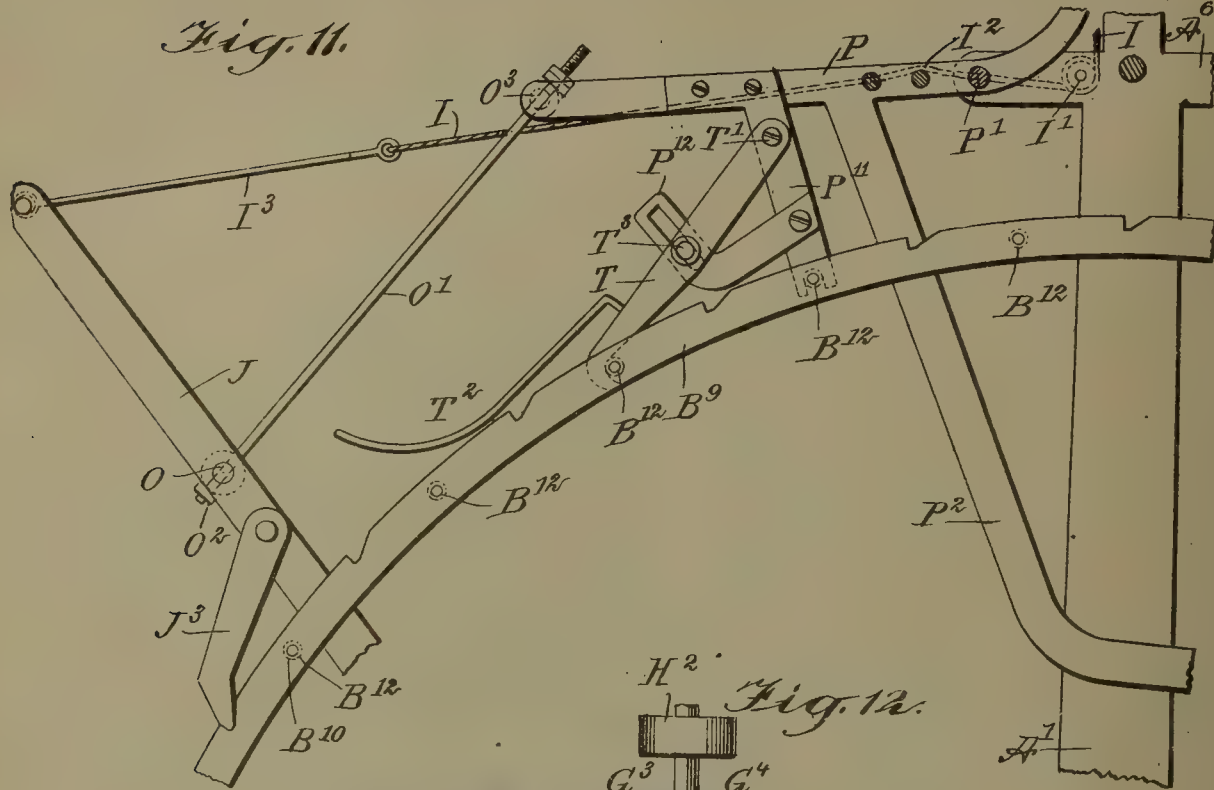


No. 864,686.

PATENTED AUG. 27, 1907.

A. A. PRATT.
MAGAZINE PHONOGRAPH.
APPLICATION FILED JAN. 17, 1906.

6 SHEETS—SHEET 6.



WITNESSES:

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UNITED STATES PATENT OFFICE.

ALLISON A. PRATT, OF NEW YORK, N. Y., ASSIGNOR TO PATENT HOLDING COMPANY, A CORPORATION OF NEW YORK.

MAGAZINE-PHONOGRAPH.

No. 864,686.

Specification of Letters Patent.

Patented Aug. 27, 1907.

Application filed January 17, 1906. Serial No. 296,480.

To all whom it may concern:

Be it known that I, ALLISON A. PRATT, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Magazine-Phonograph, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved magazine phonograph arranged to carry a large number of record rolls, to enable the user to select any one of the record rolls desired to be played, to provide a simple mechanism for accurately bringing the selected record roll in playing position, to automatically start the machine, and to automatically stop the same at the end of the piece.

The invention consists of novel features and parts and combinations of the same, which will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a front elevation of the improvement; Fig. 2 is an enlarged front elevation of the improvement, parts being in section and the casing being removed; Fig. 3 is an enlarged transverse section of the improvement, the parts being in playing position; Fig. 4 is a sectional side elevation of the driving gear for the record rolls and the feed screw for the carriage carrying the reproducer mechanism; Fig. 5 is a rear sectional side elevation of the reproducer mechanism, on the line 5—5 of Fig. 3; Fig. 6 is a cross section of the same, showing the parts at rest; Fig. 7 is a rear sectional side elevation of the same; Fig. 8 is an enlarged transverse section of the improvement, on the line 8—8 of Fig. 1, showing more particularly the motor and a coin-controlled mechanism employed in connection with the improvement; Fig. 9 is an enlarged plan view of the stopping mechanism for the motor; Fig. 10 is an enlarged sectional plan view of the coin-controlled mechanism, the section being on the line 10—10 of Fig. 8; Fig. 11 is an enlarged side elevation, showing the mechanism for turning the magazine wheel, for returning the carriage of the reproducer mechanism, and for actuating the starting and stopping lever; Fig. 12 is a plan view of the driving gear for the carriage feed screw and for the record roll driving wheel; Fig. 13 is an enlarged sectional plan view of part of the tripping device for the starting and stopping lever; and Fig. 14 is a cross section of the same.

Within a suitably constructed casing A is arranged a standard A', from which projects a stud A² for the hub B' of a magazine wheel B to turn on, the said magazine wheel B being adapted to carry mandrels C supporting

the usual record rolls D. The magazine wheel B is provided with spokes B² extending from the hub B' and connecting with the rims B³ and B⁴ spaced apart in a transverse direction and connected with each other at intervals by suitable cross bars B⁵, as plainly shown in Fig. 3. From the rim B³ extend outwardly and radially arms B⁶ supporting, at their front faces, numeral disks E carrying numerals in consecutive order and adapted to register with an aperture A³ formed in a door A⁴ at the front of the casing A, as shown in Fig. 1, so as to display the numeral of a record to be next played when a coin is introduced, as hereinafter more fully described. Outside of the rim B⁴ and concentric therewith is arranged a rim B⁷ supported, at intervals, by bars B⁸ attached to the rim B⁴ and also carrying a concentric ratchet wheel B⁹, from the face of which project spaced centers B¹⁰ in transverse alinement with bearings B¹¹ formed on the inner faces of the arms B⁶, so that a center B¹⁰ and a bearing B¹¹ receive the ends of a mandrel C for supporting the corresponding record roll D.

As shown in Fig. 3, each mandrel C consists of a tubular shaft C' engaging the center B¹⁰ and slidably containing the point C² engaging the bearing B¹¹, a spring C³ held in the tubular shaft C' pressing the inner end of the point C² to hold the mandrel in engagement with the center B¹⁰ and the bearing B¹¹. By pressing the point C² inwardly against the tension of the spring C³, the mandrel and its record can be readily removed from the magazine wheel B whenever it is desired to do so and a new record is to be placed in position thereon. As shown in Fig. 3, a sleeve C⁴ is mounted to slide on the tubular shaft C', and on the outer end of this sleeve C⁴ is secured a head C⁵ engaging one end of the record roll D, engaged at the other end by a head C⁶ provided with a sleeve C¹ mounted to slide on the sleeve C⁴. Thus, by removing the head C⁵ from one end of the mandrel C, the record roll D can be removed and replaced by a new one, after which the head C⁵ is returned to position, in order to clamp the record roll D between the heads C⁵ and C⁶. On the shaft C' of the mandrel C is secured a driving disk C⁸ adapted to be moved in peripheral engagement with a driving wheel F for rotating the mandrel C and the record roll D thereon at the time the record roll is in playing position and is engaged by the reproducer mechanism G, as hereinafter more fully described.

The wheel F, as well as the feed screw G' of the reproducer mechanism are driven from a motor H arranged in the casing A and preferably of the spring type having a winding-up shaft H' adapted to be engaged by a suitable winding key introduced by the operator through an aperture A⁵ formed in the casing A, to allow the operator to wind up the motor H whenever it is necessary to do so.

The shaft F' of the driving wheel F is journaled in a swing frame F^2 fulcrumed at F^3 on a bracket A^1 of the standard A' , and the said swing frame F^2 is pressed on by a spring F^4 . On the said shaft F' is secured a gear wheel F^5 adapted to mesh with a gear wheel F^6 secured on a shaft F^7 journaled in a bracket A^6 . By having the swing frame F^2 pressed on by a spring F^4 , it is evident that the gear wheel F^5 is normally held in mesh with the gear wheel F^6 , and at the same time the driving wheel F is held firmly in contact with the driving disk C^8 with sufficient force to insure a proper driving of the disk C^8 , and consequently of the record roll D , whenever the wheel F is rotated. On the shaft F^7 is secured a pulley H^2 connected by a belt H^3 with a pulley H^4 on the driven shaft of the motor H , so that when the latter is running, a rotary motion is transmitted by the pulleys H^2 , H^4 and belt H^3 to the shaft F^7 , which in turn rotates the driving wheel F employed for rotating the record roll D , as previously mentioned (see Figs. 2, 3 and 12).

On the feed screw G' of the reproducer mechanism G is secured a gear wheel G^2 , in mesh with an intermediate pinion G^3 journaled on the bracket A^6 and in mesh with a pinion G^4 secured on the shaft F^7 , so that when the latter is rotated by the motor H , as above mentioned, a rotary motion is transmitted by the pinions G^4 and G^3 and the gear wheel G^2 to the feed screw G' of the reproducer mechanism G (see Fig. 12).

The reproducer mechanism G is provided with the usual reproducer G^5 connected by a flexible tube G^6 with a horn G^7 secured to the casing A and extending through the front thereof, as plainly illustrated in Fig. 1, to cause the sounds produced to pass into the room in which the instrument is located. By reference to Figs. 1 and 3, it will be seen that the reproducer mechanism G is arranged directly above the magazine wheel B , and consequently but a short flexible tube G^6 is required to make the connection with the horn for transmitting the sounds from the reproducer G^5 in the shortest route possible to the horn G^7 . The reproducer G^5 is mounted on a carriage G^8 mounted to swing and to travel in a transverse direction, the carriage carrying a half nut or point G^9 for engagement with the threads of the feed screw G' , so that when the latter is rotated, the carriage G^8 with the reproducer G^5 thereon is caused to travel from the rear toward the front of the machine in the direction of the arrow a' indicated in Fig. 3. A return motion in the inverse direction of the arrow a' is given to the carriage G^8 by the following arrangement: The rear end of the carriage G^8 is connected with one end of a rope I extending over a pulley I^1 journaled on the standard A' , the rope then passing over a guide rod I^2 attached to the bracket A^6 , and then the rope connects with a link I^3 fulcrumed on the upper end of the main lever J fulcrumed at J' on the standard A' a distance below the stud A^2 , as plainly shown in Fig. 2. The lower end of the main lever J' is provided with a weight J^2 for returning the main lever to a normal position; and on the said lever J is fulcrumed a pawl J^3 for engaging the teeth of the ratchet wheel B^9 to intermittently rotate the magazine wheel B with a view to bring a record roll D in proper working position relative to the reproducer mechanism G . At the same time the carriage G^8 is drawn back into a rear or starting position by the connection of the lever J with the carriage by way of the

link I^3 and the rope I . The main lever J is under the control of the operator, and for this purpose the lower end of the lever J is connected with one end of a rope K passing over a pulley K^1 to connect with a transversely-extending lever K^2 (see Figs. 2 and 8) fulcrumed on a bracket K^3 carried by the casing A . The forward end of the lever K^2 is engaged by the forked end K^4 of a link K^5 , pivotally connected with the inner end of a coin slide L having a guide-way L' for the passage of the coin, the said coin slide L extending with its front end through a guide plate L^2 attached to the front of the casing A . The outer end of the coin slide L is provided with a suitable handle L^3 adapted to be taken hold of by the operator to push the coin slide L from the receiving position shown in Fig. 8 into a rearward position, shown in dotted lines in said figure. The rear end of the coin slide L is hung on links L^4 , and the coin slide is preferably made segmental and is provided with a stop pin L^5 adapted to abut against the inner face of the front of the casing A to limit the outward movement of the coin slide. Now, when the coin slide L is in an outermost position, as shown in full lines in Fig. 8, then a coin can be placed in the passage L' , and as the latter is inclined downwardly and rearwardly, the coin passes into a coin chute L^6 arranged on the inner face of the front of the casing A . The coin dropping down the coin chute L^6 comes in contact with a pin N fastened on the horizontal arm N' of a bell crank lever fulcrumed on a bracket N^2 arranged within the casing A , and the other arm N^3 of this bell crank lever is notched and is adapted to engage the forward end of the lever K^2 , so as to normally lock the latter against swinging. The bell crank lever is also provided with a rearwardly-extending arm N^4 provided with a weight N^5 , to normally hold the arm N^3 of the bell crank lever in locked engagement with the lever K^2 .

It is evident that when the several parts are in the position shown in Fig. 8, then the coin slide L is in an outermost position and is held against rearward movement by the locking arm N^3 engaging the lever K^2 ; but when a proper coin is introduced by way of the passage L' into the chute L^6 and the coin drops, then it strikes the pin N so as to impart a forward swinging motion to the weighted bell crank lever, to disengage the arm N^3 from the lever K^2 . The coin slide L is now unlocked, and by the operator pushing the same rearwardly causes the link K^5 to impart a swinging motion to the lever K^2 , which, by the rope K , imparts a swinging motion to the main lever J , so that the pawl J^3 thereof turns the magazine wheel B and at the same time the lever J exerts a pull on the carriage G^8 , to cause the latter to travel from its front, inactive position, to a rearward, active position. When the operator releases the coin slide L after having pushed the same inward, then the weight J^2 on the main lever J returns the same to its normal position, so that the pawl J^3 glides back over the teeth of the ratchet wheel B^9 , and at the same time the link I^3 and rope I swing into an inactive position, as plainly shown in Fig. 2. The coin, in actuating the bell crank lever by striking the arm N' , as previously described, finally passes the pin N and drops down out of the chute L^6 into the casing A , while the released bell crank lever is brought back when the coin slide L is pushed in by the action of the link K^5 , the action of the weighted arm N^4 is to hold it in normal position. When

the main lever J swings back to its normal position, it exerts a pull on the rope K so as to return the lever K², link K⁵ and slide L to allow the arm N³ of the bell crank lever to again engage the lever K² for locking the same against further movement until the next coin is introduced and the coin slide L actuated, as above explained. The main lever J also controls the starting mechanism for the motor H, and for this purpose the following arrangement is made: On the main lever J, a short distance above the pawl J³, is arranged a swivel bearing O, in which is mounted to slide a rod O' carrying, at its lower end, a head or collar O², the rod O¹ being connected at its upper end by a swivel O³ with a starting and stopping lever P, fulcrumed at P' on the bracket A⁶.

The lever P is provided with a downwardly-extending arm P² (see Fig. 2), the lower portion of which is bent at angles to extend in a nearly horizontal position, and on this portion is secured a weight P³, and the portion is engaged by the forked end P⁴ of a lever P⁵ (see Fig. 3), the lever P⁵ being connected by a link P⁶ with a bell crank lever P⁷, fulcrumed in the casing A and connected by a link P⁸ (see Fig. 2) with a lever P⁹ fulcrumed on the frame of the motor H (see Fig. 9) and adapted to engage the brake wheel H⁵ forming part of the governor H⁶ of the motor H. This governor H⁶ is of the usual spring arm type, and when the several parts are in the position as shown in Fig. 9, then the lever P⁹ is in engagement with the brake wheel H⁵, to hold the same against turning, thus preventing the motor H from running. When the main lever J is caused to swing into the position shown in dotted lines in Fig. 2 at the time the operator swings the coin slide L inwardly, as previously explained, then the lever J, when moving into its position, finally engages the swivel bearing O with the collar O² to exert a pull on the rod O' at the time the lever J about reaches the end of its stroke. When this takes place the rod O' imparts a swinging motion to the lever P, so that the latter imparts a swinging motion to the lever P⁵, which, by the link P⁶, imparts a swinging motion to the bell crank lever P⁷ and the latter, by the link P⁸, imparts a swinging motion to the lever P⁹, to move the latter out of engagement with the brake wheel H⁵, thus allowing the motor to start and run in the usual manner.

From the foregoing it will be seen that at about the time the magazine wheel B is turned by the action of the main lever J and its pawl J³ to bring a desired record into active position relative to the reproducer mechanism G, then the carriage G⁸ with the reproducer mechanism G thereon is moved from a front, inactive position, to a rearmost, active position, and at the same time the motor H is started, to rotate the driving disk F and consequently the record roll D in active position, as well as to rotate the feed screw G' for moving the carriage G⁸ from the rear, forward, and with the stylus of the reproducer mechanism G in contact with the record roll surface.

In order to prevent the starting and stopping lever P from swinging from a starting and running position back into a stopping position at the time the main lever J returns on the release of the coin slide L, the following arrangement is made, special reference being had to Figs. 3, 13 and 14. A pin R is adapted to move into the path of the lever P after the same has been caused to swing by the action of the main lever J, and this pin

R projects eccentrically from a disk R' mounted to turn at R² on a bracket attached to the standard A'. An arm R³ extends upward from the disk R', and on the upper end of this arm R³ is secured a forwardly-extending rod R⁴, on which is coiled a spring R⁵ resting with one end on the arm R³ and pressing, at the other end, on an arm R⁶ secured to the bracket A⁶ (see Fig. 3). The extreme forward end of the rod R⁴ is provided with a nut R⁷ engaged by the upper end of a lever S, swiveled at S' on the bracket A⁶, and on the lower end of the said lever S is secured a spring arm S² provided with an inclined terminal S³ adapted to be engaged by the carriage G⁸ at the time the latter moves from the rear toward the front and nears the front end position. When the carriage G⁸ engages this inclined arm S³, it imparts a sidewise swinging movement to the lever S so as to bring the pin S⁴ thereof (see Figs. 5 and 7) into the path of a cam S⁵ secured on the forward end of the feed screw G', and consequently this cam S⁵ engages the pin S⁴, and thereby imparts a transverse swinging movement to the lever S. In doing so, the upper end of the lever S acts on the nut R⁷ to pull the rod R⁴ forward, so that the arm R³ turns the disk R' and thereby moves the pin R away from the starting and stopping lever P. As soon as this takes place the weight P³ of the starting and stopping lever P causes a return movement of the latter, so that the lever P⁹ moves in engagement with the disk H⁵, to stop the motor H. Immediately previous to the cam S⁵ acting on the pin S⁴ and lever S, as above explained, it is necessary to impart a swinging motion to the carriage G⁸, with a view to move the half nut or point G⁹ thereof out of engagement with the threads of the feed screw G'. For this purpose the carriage G⁸ is provided with a friction roller G¹⁰ adapted to engage a cam G¹¹ secured on the feed screw G' adjacent to the cam S⁵, so that when the carriage G⁸ moves into its forward position, then the friction roller G¹⁰ is engaged by the cam G¹¹, to impart a swinging motion to the carriage G⁸, with a view to lift the point G⁹ out of engagement with the feed screw G' at the very time the swinging motion is given to the lever S to pull the rod R⁴ forward, with a view to release the starting and stopping lever P. When the latter returns to its normal position, then the guide bar P¹⁰ extending transversely on the said lever engages the carriage G⁸ so as to hold the same in a non-active position relative to the feed screw G'; and when the lever J is again actuated, after the introduction of a second coin, as above explained, then the carriage G⁸ slides from the front to its rearmost position with the carriage G⁸ traveling along the guide bar P¹⁰ and with the point G⁹ out of engagement with the threads of the feed screw G'.

In order to prevent the magazine wheel B from being turned too far by the action of the main lever J, and its pawl J³, a dog T is hung, at T', on the starting and stopping lever P, and this dog is adapted to engage pins B¹² forming rearward extensions of the centers B¹⁰ (see Figs. 3 and 11). The dog T is provided with a cam arm T² riding on the fulcrumed end of the pawl J³, to normally keep the dog T in a raised position; that is, out of the path of the teeth B¹², the said cam arm T² allowing the dog T to drop down between two pins B¹² at the time the lever J and its pawl J³ nearly reach the end of their forward stroke and the cam arm T² leaves the pawl J³ (see Fig. 11). When the magazine wheel B has been

turned by the main lever J and pawl J³ until a record roll D has moved in proper position relative to the reproducer mechanism G, then the dog T engages a pin B¹² and thus holds the magazine wheel B against further turning (see Fig. 11). When the main lever J swings back to its normal position, then the cam arm T² reengages the pawl J³ and lifts the dog T up out of engagement with the corresponding pin B¹².

In order to lock the magazine wheel B during the performance, that is, while the carriage G⁸ travels from the rear to the front, a locking arm P¹¹ is provided and fixed on the starting and stopping lever P, the locking arm P¹¹ being forked at the lower end to engage a pin B¹² on the magazine wheel B at the time the starting and stopping lever P swings into starting position and is held therein by the pin R, as previously explained. When the pin R swings out of engagement with the starting and stopping lever P at the end of the performance, and the starting and stopping lever P returns to its normal position by the action of the weight P³, then the locking arm P¹¹ moves out of engagement with the pin B¹², to allow free rotation of the magazine wheel B. The downward swinging motion of the dog T is limited by a pin T³ engaging an elongated slot in an extension P¹² of the arm P¹¹, as illustrated in Figs. 2 and 11.

In order to enable the user of the machine to select any one of the record rolls D for playing, a wheel U is in peripheral contact with the ratchet wheel B⁹, and the wheel U is located at the bottom of the ratchet wheel and is secured on a transverse shaft U' journaled in suitable bearings arranged on the standard A'. The forward end of the shaft U' extends through the front of the casing A, and on the outer end of this shaft U' is secured a crank arm U² under the control of the operator, for turning the shaft U' and the wheel U to rotate the magazine wheel B, so as to bring any one of the numeral disks E into register with the aperture A³, it being understood that the numeral on this numeral disk indicates the record roll adjacent to or at one side of the reproducer mechanism G. As shown in Figs. 1 and 2, the numeral 5 is in register with the aperture A³, and the record roll at this numeral disk E is now in position relative to the reproducer mechanism G, so that when the main lever J is caused to swing and the magazine wheel B is turned, then this record roll moves into active position relative to the reproducer mechanism G.

It will be noticed that by arranging the lever J and its pawl J³ relative to the ratchet wheel B⁹, as shown in Fig. 2, the magazine wheel B can be freely turned forward or backward by the operator manipulating the crank arm U² as the pawl J³ rides over the teeth of the ratchet wheel B⁹ on turning the magazine wheel B as long as the main lever J is in the normal position and the fulcrum of the pawl J³ is close to the peripheral face of the ratchet wheel B⁹. When the main lever J is swung downward, however, to the position shown in Fig. 11, then the fulcrum end of the pawl J³ moves further outward, and the free end of the pawl J³ now readily engages the ratchet tooth and turns the magazine wheel B the desired distance. It is understood that the action just described is due to the fulcrum J' of the main lever J being located a distance below the axis of the magazine wheel B.

The operation is as follows: When the several parts

are in the position as illustrated in Figs. 1, 2 and 8, then the operator can readily turn the magazine wheel B by manipulating the crank arm U² until the numeral of a desired record appears in the aperture A³. When this has been done, the operator lays a coin in the passage L' of the coin slide L, and as soon as the coin is introduced and rolls down into the chute L⁶ and acts on the pin N to release the lever K², as previously described, then the operator pushes the coin slide L inwardly so that a swinging motion is given to the lever K², which, by the connection above described, causes the main lever J to swing in the direction of the arrow b', so that the pawl J³ finally turns the magazine wheel B to bring the record roll of the numeral 5 into active position relative to the reproducer mechanism G. At the same time the carriage G⁸ is drawn from a front into a rearward position and the starting and stopping lever P is actuated to set the motor H running, as above described. When the lever P is caused to swing to start the motor H, then the pin R swings in engagement with the lever P, owing to the action of the spring R⁵, so that the lever P is locked in the starting position and the reproducer is lowered so as to allow the stylus to engage the record. As soon as the motor H begins to run, the driving wheel F, as well as the feed screw G', are rotated, so that the record roll D is turned, and at the same time the carriage G⁸ for the reproducer mechanism G is caused to travel from the rear toward the front, owing to the point G⁹ engaging the rotating feed screw G'. As the stylus of the reproducer mechanism G is in contact with the rotating record roll D and also moves forward, it is evident that the usual production of the sounds takes place, the sounds being transmitted to the horn G⁷, from which they can readily pass into the room in which the machine is located. After the stylus has reached the end of the record roll D, then the carriage G⁸ moves in engagement with the inclined arm S³ of the lever S, so as to first impart a sidewise swinging motion to the lever S, with a view to bring the pin S⁴ into the path of the cam S⁵. The latter now imparts a transverse swinging motion to the lever S so that the said lever pulls on the spring-pressed rod R⁴ to move the pin R out of engagement with the starting and stopping lever P, to allow the latter to swing into a stopping position, thereby stopping the motor H. Immediately previous to the cam S⁵ acting on the pin S⁴, as described, the friction roller G¹⁰ engages the cam G¹¹ so that a swinging motion is given to the carriage G⁸, to move the point G⁹ out of engagement with the feed screw G'; and when the starting and stopping lever P swings into the stopping position, as described, then the guide bar P¹⁰ engages the carriage G⁸, thus holding the same in a non-active position; that is, with the point G⁹ out of engagement with the feed screw G'. In the meantime the feed screw G', as well as the friction wheel F have come to a standstill, owing to the stopping of the motor H, so that the several parts come into a non-active, normal, dormant position, with the carriage G⁸ remaining in a forward position.

It is understood that as soon as the operator releases the coin slide L, the main lever J and parts connected therewith swing back to a normal position, owing to the action of the weight J², so that the coin slide L, as well as the main lever J, are back in normal position soon

after the motor H is started, to be ready for the next performance.

By reference to Fig. 3 it will be seen that the record roll D and its supporting heads C⁵ and C⁶ can be moved lengthwise on the mandrel C, so that the starting and stopping of the reproduction takes place at the proper time; that is, in practice the record roll D, as well as the feed screw G', are turning a short while before the stylus begins to engage the record roll D.

- 10 It is understood that the pin R and connected parts form a tripping device for the starting and stopping lever P; that is, as long as the pin R is in engagement with the lever P the latter is in starting motion and allows the motor H to run; but when the pin R is moved out of engagement with the lever P by the action of the lever S and cam S⁵, then the lever P drops into stopping position and stops the motor H, and, by the guide bar P¹⁰, holds the carriage G⁸ in non-active position relative to the feed screw G'.
- 20 From the foregoing it will be seen that the operator, on manipulating the coin slide L, causes a turning of the magazine wheel B, a return or rearward motion of the carriage G⁸, and a swinging motion of the starting and stopping lever P, to swing the latter into starting position. The only function of the coin passed into the machine by the coin slide L and coin chute L⁶ is to actuate the weighted bell crank lever, to release the lever K² connected with and operated by the coin slide L.
- 30 I do not limit myself to the particular constructions of the various mechanisms shown and described, as the same may be varied without deviating from the spirit of my invention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

- 35 1. A magazine phonograph, comprising a magazine wheel on which the record rolls are mounted to turn, a reciprocating carriage carrying the phonograph reproducer adapted to contact with the record roll in an active position at the time, a driving gear for the said record roll and for the feed screw of the said carriage, a motor for the said driving gear, a ratchet wheel on the said magazine wheel, a main lever carrying a pawl for the said ratchet wheel to rotate the latter and the magazine wheel intermittently, to bring a record roll into active position relative to the said driving gear and the said phonograph reproducer, a connection between the said main lever and the said carriage to move the latter into starting position, and starting means controlled by the said lever and connected with the said motor to start the latter.

- 40 2. A magazine phonograph, comprising a magazine wheel on which the record rolls are mounted to turn, a reciprocating carriage carrying the phonograph reproducer adapted to contact with the record roll in an active position at the time, a driving gear for the said record roll and for the feed screw of the said carriage, a motor for the said driving gear, a ratchet wheel on the said magazine wheel, a main lever carrying a pawl for the said ratchet wheel to rotate the latter and the magazine wheel intermittently, to bring a record roll into active position relative to the said driving gear and the said phonograph reproducer, a connection between the said main lever and the said carriage to move the latter into starting position, starting means controlled by the said lever and connected with the said motor to start the latter, and stopping means controlled by the said feed screw for throwing the carriage out of engagement with its feed screw and for controlling the said starting means, to throw the latter out of gear to stop the motor.

- 70 3. A magazine phonograph provided with a carriage carrying the phonograph reproducer, a feed screw for im-

parting a traveling motion to the said carriage in one direction, a cam on the said feed screw for throwing the carriage out of engagement with the feed screw, a stopping mechanism for the feed screw, a tripping mechanism for the said stopping mechanism, and a second cam on the feed screw for actuating the said tripping mechanism immediately after the carriage is thrown out of engagement with the feed screw.

4. A magazine phonograph provided with a carriage carrying the phonograph reproducer, a feed screw for imparting a traveling motion to the said carriage in one direction, a cam on the said feed screw for throwing the carriage out of engagement with the feed screw, a stopping mechanism for the feed screw provided with a guide bar for the said carriage during the return movement thereof, a tripping device for the said stopping device having a spring-pressed tripping lever for the said stopping mechanism, a cam lever connected with the tripping lever, and a second cam on the said feed screw for actuating the said cam lever.

5. A magazine phonograph provided with a carriage carrying the phonograph reproducer, a feed screw for imparting a traveling motion to the said carriage in one direction, a cam on the said feed screw for throwing the carriage out of engagement with the feed screw, a weighted starting and stopping lever, a motor controlled by the said starting and stopping lever and connected with the said feed screw to rotate the latter, a guide bar on the said starting and stopping lever for the return movement of the carriage, a tripping lever for the said starting and stopping lever and its guide bar, and a second cam on the said feed screw controlling the said tripping lever immediately after the said carriage is thrown out of engagement with the said feed screw.

6. A magazine phonograph provided with a magazine wheel for carrying the record rolls, comprising a hub, spokes and a rim, the latter being provided, at one side, with a ratchet wheel carrying spaced transversely-extending centers adapted to engage recesses in one end of the mandrels of the record rolls, and radially-disposed rods having bearings for the other ends of the mandrels arranged directly opposite the centers on the ratchet wheel.

7. A magazine phonograph provided with a magazine wheel for carrying the record rolls, a ratchet wheel on the said magazine wheel, a main lever carrying a pawl for engagement with the said ratchet wheel, a motor, a starting and stopping lever for the same, and a connection between the said main lever and the said starting and stopping lever to actuate the latter on the main lever nearing the end of its forward stroke.

8. A magazine phonograph provided with a magazine wheel for carrying the record rolls, a ratchet wheel on the said magazine wheel, a main lever carrying a pawl for engagement with the said ratchet wheel, a motor, a starting and stopping lever for the same, a connection between the said main lever and the said starting and stopping lever to actuate the latter on the main lever nearing the end of its forward stroke, stop pins on the said magazine wheel, and a hook arm pivoted on the said starting and stopping lever and adapted to engage the said stop pins.

9. A magazine phonograph provided with a magazine wheel for carrying the record rolls, a ratchet wheel on the said magazine wheel, a main lever carrying a pawl for engagement with the said ratchet wheel, a motor, a starting and stopping lever for the same, a connection between the said main lever and the said starting and stopping lever to actuate the latter on the main lever nearing the end of its forward stroke, stop pins on the said magazine wheel, a hook arm pivoted on the said starting and stopping lever and adapted to engage the said stop pins, and a cam on the said hook arm engaging the said main lever.

10. A magazine phonograph provided with a magazine wheel for carrying the record rolls, a ratchet wheel on the said magazine wheel, a main lever carrying a pawl for engagement with the said ratchet wheel, a motor, a starting and stopping lever for the same, a connection between the said main lever and the said starting and stopping lever to actuate the latter on the main lever nearing the end of its forward stroke, stop pins on the said magazine wheel, a hook arm pivoted on the said starting and stop-

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ping lever and adapted to engage the said stop pins, and a positive locking arm on the said starting and stopping lever for engaging the said stop pins.

11. A magazine phonograph provided with a magazine wheel for carrying the record rolls, a ratchet wheel on the said magazine wheel having ratchet teeth, cams each located between adjacent ratchet teeth, and a main lever mounted to swing and carrying a pawl for engaging the said ratchet teeth and the said cams.

12. A magazine phonograph provided with a magazine wheel for carrying the record rolls, a ratchet wheel on the said magazine wheel having ratchet teeth, cams each located between adjacent ratchet teeth, and a main lever mounted to swing and carrying a pawl for engaging the said ratchet teeth and the said cams, the fulcrum of the said main lever being at a point below the axis of the said magazine wheel.

13. A magazine phonograph provided with a reproducer mechanism, a magazine wheel for carrying the record rolls, a ratchet wheel on the said magazine wheel having ratchet teeth, manually controlled means for turning the magazine wheel to bring any desired record in position adjacent to the reproducer mechanism, a main lever controlled by the operator, and having its fulcrum below the axis of the said magazine wheel, a pawl carried by said lever and adapted to engage the ratchet teeth to turn the magazine wheel and bring the selected record roll into active position relative to the reproducer mechanism, the said pawl when the lever is in normal position being out of operative engagement with the ratchet teeth, and means for returning the lever to its normal position.

14. A magazine phonograph having a friction drive for the record roll, the said friction drive comprising a friction disk on the mandrel of the record roll, a friction

wheel, a swing frame in which the friction wheel is journaled, a shaft, means for driving the same, a gear wheel on said shaft in mesh with a gear wheel on the shaft of the friction wheel, and a spring pressing on said swing frame and normally holding said gear wheels in mesh and said friction wheel in contact with said friction disk.

15. A magazine phonograph having a magazine wheel for carrying the record rolls, a ratchet wheel on the said magazine wheel, a main lever having its fulcrum below the axis of the said magazine wheel, a pawl fulcrumed on the upper part of said lever and adapted to engage the ratchet wheel to turn the same and the magazine wheel when the lever is swung from its normal position, a weight on the lower end of said lever for returning the same to a normal position, and means connected with the lower end of the lever for actuating the same, the said means being under the control of the operator.

16. A magazine phonograph provided with a carriage carrying the phonograph reproducer, a magazine wheel for carrying the record rolls, a ratchet wheel on the said magazine wheel, a main lever carrying a pawl for engagement with the said ratchet wheel, a motor, a starting and stopping lever for the same, a connection between the said main lever and the carriage to move the latter into starting position, and a connection between the main lever and the said stopping and starting lever to actuate the latter.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALLISON A. PRATT.

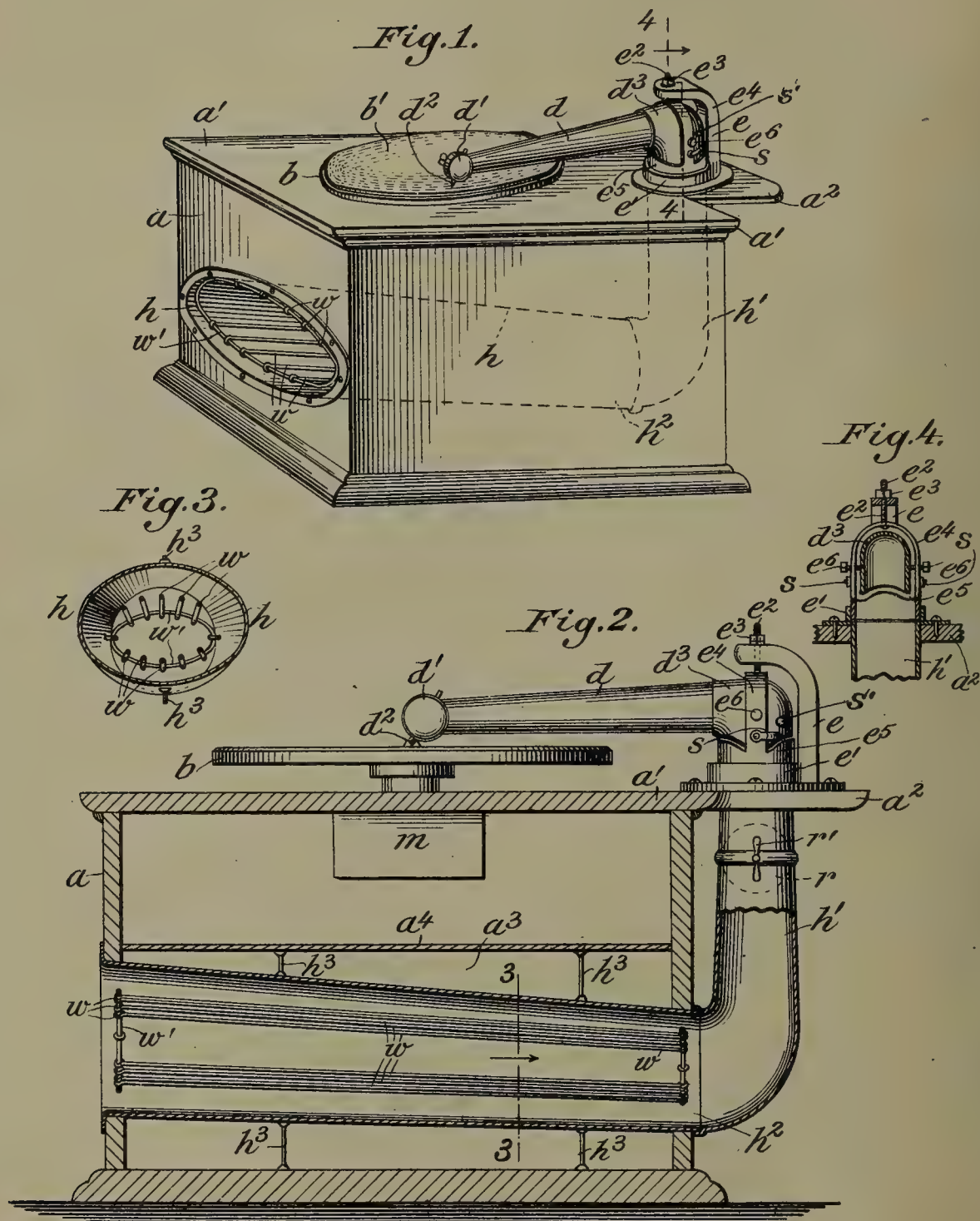
Witnesses:

THEO. G. HOSTER,
JNO. M. RITTER.

H. SCHRÖDER.

GRAMOPHONE.

APPLICATION FILED DEC. 8, 1906.



Witnesses:

L. H. Schmidt.
W. N. Woodson.

Inventor:

Hermann Schröder,

By *Thos. M. Lacy, Atty.*

UNITED STATES PATENT OFFICE.

HERMANN SCHRÖDER, OF NEWARK, NEW JERSEY, ASSIGNOR TO H. SCHRÖDER HORNLESS
PHONOGRAPH MANUFACTURING COMPANY, A CORPORATION OF NEW YORK.

GRAMOPHONE.

No. 864,758.

Specification of Letters Patent.

Patented Aug. 27, 1907.

Application filed December 8, 1906. Serial No. 346,964.

To all whom it may concern:

Be it known that I, HERMANN SCHRÖDER, a citizen of Germany, residing at Newark, in the county of Essex and State of New Jersey, United States of America, have invented certain new and useful Improvements in Gramophones, of which the following is a specification.

This invention contemplates certain new and useful improvements in that type of talking machine or gramophone in which the megaphone instead of being arranged separately and detachably above the supporting casing of the sound record, is arranged in a permanent position within the casing so as to be more conveniently shipped with the casing, to require no adjustment, and to avoid any damage to a record which is liable to occur with the megaphone detachably supported above it.

The object of my invention is to provide an improved construction of talking machine of this type, the horn or megaphone of which is provided with means designed to increase the clearness and mellowness of the reproduced sound and which is composed of comparatively few and simple parts that are not liable to get out of order, but that will operate efficiently so as to allow the sound box at the end of the tapering arm which carries it to follow easily the grooves or depressions in the sound disk or record while the megaphone is permanently mounted without movement, in a sound box within the casing of the machine and is effectively connected to the tapering arm carrying the sound box, in such a manner as to interfere in no wise with the free movement thereof in a lateral direction to reproduce the record and also to interfere in no wise with the proper limited movement of the said arm in a vertical direction for the purpose of removing one disk and replacing it by another.

With these and other objects in view as will more fully appear as the description proceeds, the invention consists in certain constructions, arrangements and combinations of the parts hereinafter described and claimed, reference being had to the accompanying drawing in which:

Figure 1 is a perspective view of my improved gramophone; Fig. 2 is a vertical longitudinal sectional view of the same upon a slightly larger scale; Fig. 3 is a detail transverse sectional view, the section being taken approximately on the line 3—3 of Fig. 2 and looking in the direction of the dart; and, Fig. 4 is a detail vertical sectional view on the line 4—4 of Fig. 1, looking in the direction of the dart.

Corresponding and like parts are referred to in the following description, and indicated in all the views of the drawings by the same reference characters.

Referring to the drawings, the letter *a* designates the casing of my improved talking machine or gramophone, and *a'* the top of said casing, said top being provided with a rear extension constituting a ledge *a*².

m designates the box designed to receive the motor and adapted to revolve the table *b* which is supported or journaled upon the top *a'* of the case *a* and which is intended in turn to support the sound disk or record *b'*.

An opening is formed through the ledge *a*² and encircling this opening is an upright ring *e'* from which there extends upwardly a bracket *e*, the said bracket and ring *e'* being preferably integrally connected. The upper end of the bracket *e* curves forwardly and is apertured to receive a threaded pin *e*² which is held at different vertical adjustments therein by means of nuts *e*³. The lower end of the pin *e*² projects below the forwardly extending upper end of the bracket *e* and into engagement with the upper end of an inverted U-shaped band *e*⁴ which is integrally connected at its lower end to an annulus *e*⁵ preferably provided with a curved upper edge as shown best in Figs. 1 and 2. The annulus *e*⁵ fits within the ring *e'* and is guided by the said ring, it being permitted to turn freely in a horizontal plane therein, and the band or bar *e*⁴ also turns with the annulus *e*⁵ and is held to move in a true horizontal plane about the contacting end of the pin *e*² as an axis. The bar *e*⁴ and annulus *e*⁵, together constitute a stirrup, which is adapted to receive an elbow *d*³ suspended within the stirrup, as best seen in Fig. 4 by means of two inwardly projecting set screws as seen at *e*⁶ which impinge upon it at opposite sides. Hence, it will be seen that the elbow *d*³ may be turned freely about the pins *e*⁶ in a vertical plane and may also be turned in a horizontal plane and freely, with the stirrup in which it is mounted. To limit the rocking movement of the elbow *d*³ in a vertical plane, I provide any desired form of stop device. In the present instance, I have shown for this purpose spring latches *s* which are secured at one end to the bar *e*⁴ and are adapted to contact with recesses or studs *s'* on the elbow, as is evident from inspection of Fig. 2.

The elbow *d*³ is adapted to receive in its horizontal end, the larger end of the tapering arm *d* which carries the sound box *d'* and the stylus *d*², these forming by themselves no part of my invention.

h designates the megaphone or horn of my invention, the same embodying a vertically disposed portion *h'* which is fitted at its upper end within the opening of the ledge *a*² and which is adapted to support the annulus *e*⁵, as best seen in Fig. 4. The megaphone also embodies a tapered horizontally disposed portion *h*² which is connected at its lower end to the portion *h'*, (the latter having its end formed into an elbow to receive the smaller end of the portion *h*²), and the portion *h*² of the horn extends completely through the case *a*, from the rear side to the front and is preferably flanged outwardly at its larger front end, as best seen in Fig. 1, the said flange being secured by screws, or any desired fastening means to the front of the case. The said portion *h*² is located within a compartment

a^3 which is produced by the bottom of the case a and the horizontal partition a^4 and to hold the said portion h^2 rigidly in place, upper and lower supporting plates h^3 may be provided. The vertically disposed portion h' of the magaphone is located entirely without the case as shown, although it is practically protected from injury in shipping by means of the ledge a^2 , and this portion of the megaphone is provided with a sound regulator r which may be set by a handle r' so as to regulate the opening for the passage of the sound waves from the diaphragm and the tapering arm to the lower part of the horn.

In the lower, enlarged, conical portion h^2 of the horn are arranged thin longitudinal wires w which are supported at their ends by oval wires w' which are attached to the side-walls of the horn and which serve for vibrating with the sound-waves as they are conducted from the vertical portion of the horn to the horizontal portion, said wires exerting a softening influence on the sounds and delivering the same in a clear and distinct manner at the outgoing end of the horn.

The advantages of my improved phonograph are that the horn is not arranged as a separate detachable portion of the same, but is arranged in permanent connection with the lower part of the casing, so that the same can be packed and shipped with the casing, the phonograph being immediately on unpacking the shipping box ready for use, all that is necessary being to arrange the sound-record on the rotary table or disk, regulate the stylus for the same, and adjust the suspension-pivot of the upper hollow tapering arm of the horn. The lower enlarged part of the horn remains always stationary in the box, while the upper part with the sound-box follows the motion of the depressions in the sound-record as it is capable of swinging on the suspension-pivot in lateral direction, while the vertical motion of the sound-box and its tapering arm

necessary for removing and replacing the sound-record is permitted by the pivotal connection of the elbow with the holder. The sound-box in the lower part of the casing for the enlarged part of the horn and the longitudinal wires in the same improve the softness and clearness of the sounds which are emanating from the same and render the sounds more pleasing and agreeable.

Having thus described the invention, what is claimed as new is:

1. In a talking machine, the combination with a case, a record table journaled upon said case, a sound box and supporting arm therefor, of a ring mounted upon said case, a bracket extending upwardly and forwardly from said ring to a point over the same, a stirrup consisting of an inverted U-shaped bar, and an annulus connected to the lower ends of said bar, the said annulus being fitted to turn within the said ring, a pivot pin mounted in the upper end of said bracket and extending through the same into contact with the said bar, an elbow received within the stirrup and pivoted to the bar thereof to rock in a vertical plane, one end of said elbow receiving the said supporting arm for the sound box, a megaphone having a stationary portion disposed horizontally within the case and extending therethrough, said megaphone also embodying a vertically disposed portion extending from one end of the stationary portion up to the elbow.

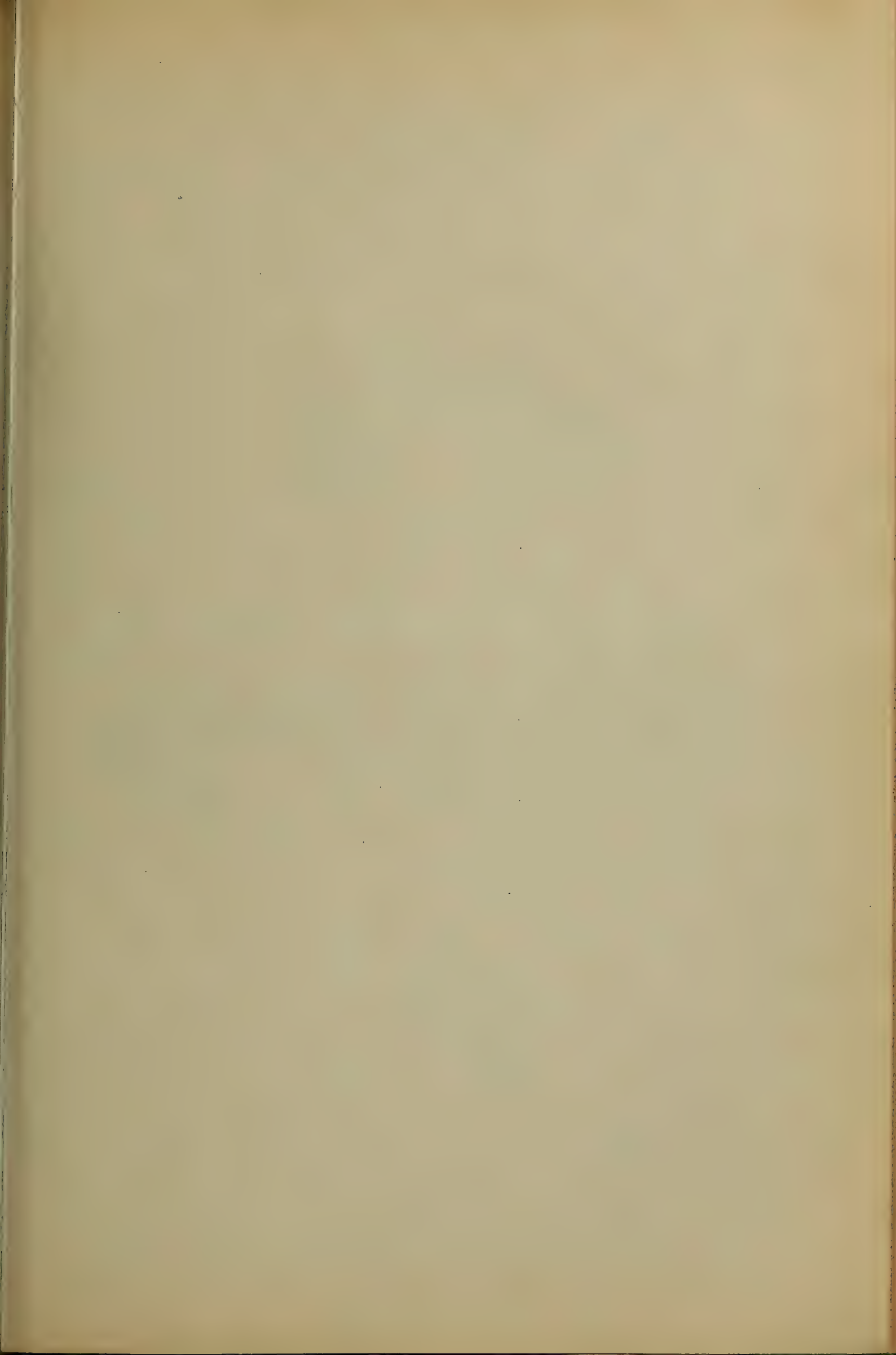
2. In a talking machine, the combination of a case, a record table mounted to revolve on said case, a sound-box and supporting arm therefor, the top of the case being provided with a rearwardly projecting ledge having an opening formed therein, of a stationary megaphone disposed within said case and provided with an elbow extending outside of the case and up into the ledge, a universal joint connected between the supporting arm and said elbow, and a sound regulator mounted in the said elbow, outside of the case.

In testimony whereof I affix my signature in presence of two witnesses.

HERMANN SCHRÖDER. [L. s.]

Witnesses:

FREDERICK S. STITT,
W. N. WOODSON.



L. F. DOUGLASS.
MOUNTING FOR THE STYLUS BAR OF TALKING MACHINES.
APPLICATION FILED MAR. 8, 1906.

Fig. 1.

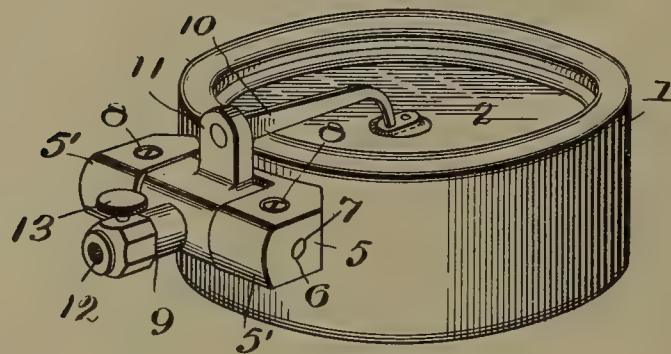


Fig. 2.

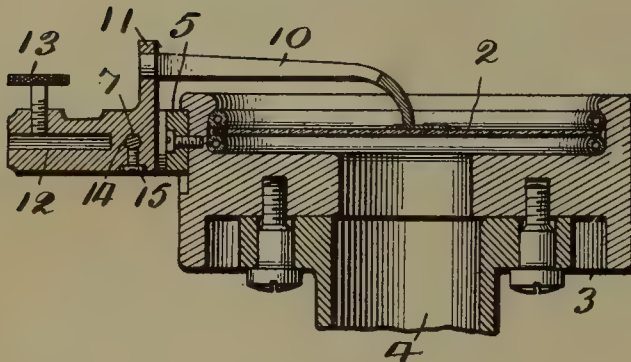


Fig. 3.

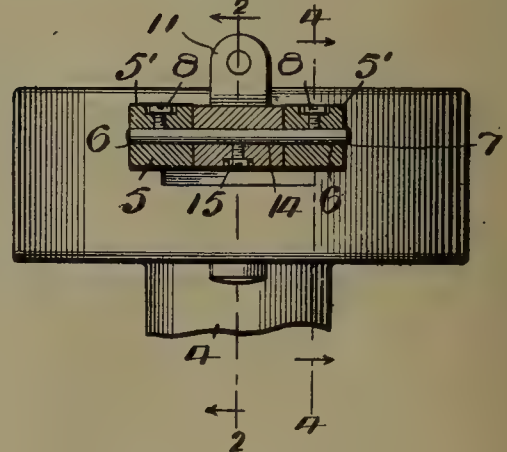
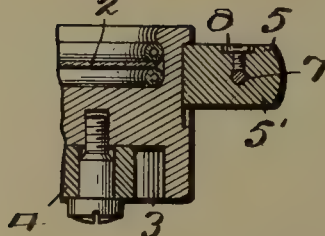


Fig. 4.



Witnesses

F. E. Barry
Alexand B. Moulton

Inventor
Leon F. Douglass

By

Wm. L. Ladd

Attorney

UNITED STATES PATENT OFFICE.

LEON F. DOUGLASS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

MOUNTING FOR THE STYLUS-BAR OF TALKING-MACHINES.

No. 865,088.

Specification of Letters Patent.

Patented Sept. 3, 1907.

Application filed March 8, 1906. Serial No. 304,910.

To all whom it may concern:

Be it known that I, LEON F. DOUGLASS, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain
5 new and useful Improvements in Mountings for the Stylus-Bars of Talking-Machines, of which the following is a full, clear, and complete disclosure.

One object of my invention is to produce a mounting for the stylus bar of a sound box of a talking machine, in
10 which the stylus bar may be more delicately, perfectly and efficiently mounted than heretofore, and the position and the tension of the stylus bar with respect to the diaphragm may be quickly and easily adjusted.

Other objects of my invention will appear below in
15 the specification and claims forming a part of this application.

Heretofore the sound boxes in which the stylus bar has been mounted upon a torsional device for giving a tension thereto, or for holding said stylus bar in position, the torsional device or spring has been attached
20 rigidly to the casing of the sound box and to the stylus bar, and no means have been provided for the axial adjustment of the stylus bar so that its pressure or tension in relation to the diaphragm may be varied, and this
25 lack of adjustability of the torsional mounting for the stylus bar is a disadvantage which reduces the efficiency and quality of the reproductions by the sound box.

Briefly, my invention comprises an improved torsional mounting for a stylus bar which may be easily adjusted by means of suitable holding or clamping devices located in both the stylus bar and the bearings for the
30 torsional device.

For a full, clear and exact description of my invention reference may be had to the following specification and the accompanying drawings forming a part thereof, in which

Figure 1 is a perspective view of a sound box having my improved stylus mounting secured thereto; Fig. 2
40 is a transverse sectional view thereof taken on the line 2—2, Fig. 3; Fig. 3 is a sectional view of the mounting taken on the plane passing through the torsional spring or wire perpendicular to the plane of the diaphragm; Fig. 4 is a sectional view through one of the arms of my
45 improved mounting taken on the line 4—4 Fig. 3.

Referring to the drawings, 1 indicates the usual cylindrical casing or ring in which the diaphragm 2 is mounted, said ring being provided with a transverse partition or back 3, to which is attached the sound conducting
50 tube 4, in any suitable or well known manner. Attached to one portion of the periphery of the ring 1 is a U-shaped block 5, the arms 5' of which are provided with apertures 6 in alinement, through which passes the torsional pin, wire or spring 7, upon which the stylus

bar is carried. Said pin, wire or spring smoothly fits
55 within said apertures 6 in said U-shaped block, and is secured within the same by set screws 8—8, the inner end of which jam or press against said torsional spring.

The stylus bar consists of two main parts, a portion 9 of which is adapted to receive the stylus needle, and the
60 portion 10 of which is connected with the first main portion and also with the diaphragm 2. The portion 9 is preferably made in the form of an L-shaped block, the one arm 11 of which is attached to the portion 10 which connects with the diaphragm, and the other arm of
65 which is provided with a socket 12 and set screw 13, by which the stylus is secured thereto. Passing through the said block is a transverse hole 14, within which the torsional spring or wire 7 smoothly fits, and a set screw
70 15 carried by said block is adapted to engage said torsional wire or spring 7 and clamp the stylus bar firmly to said spring. The inner faces of the arms 5' of the U-shaped block are accurately squared with respect to the apertures 6 therein, and the L-shaped block has its ends
75 also squared to fit smoothly between the arms of said block.

A stylus bar mounted in the manner above described is very rigidly or firmly held between the arms of the supporting block, and the torsional spring or wire being at all times in contact with the holes in the block and
80 stylus bar is so confined that it can move only torsionally, and any buckling or bending of the torsion spring is absolutely prevented. Moreover, the tension or pressure between the stylus bar and the diaphragm can be accurately adjusted since it is merely necessary
85 to press the inner end of the stylus bar against the diaphragm with the required pressure, while either the set screw 15 or the set screws 8 are loose, and then hold or secure the stylus bar in such adjusted position by screwing the set screws down against the torsional
90 spring.

While I have described one embodiment of my invention I do not desire to be limited to the particular construction of sound box or of stylus bar above shown and described, since my invention contemplates the mounting of any stylus bar upon a torsional spring between
95 shoulders which closely fit against the said stylus bar, whereby the stylus bar is prevented from moving in any direction except around said spring as an axis, the spring being so confined that it can only be flexed torsionally.
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Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States, is:—

1. In a sound box for talking machines, a stylus bar, a support having arms fitting against opposite sides of said stylus bar and a torsional spring passing through said stylus bar and said arms.
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2. In a sound box for talking machines a stylus bar, a support therefor, a torsional spring passing through said stylus bar and said support and means to prevent the stylus bar from moving in any direction except about the torsional spring as an axis.

3. In a sound box for talking machines the combination with a stylus bar of a support therefor, a torsional spring passing through said support and stylus bar, said support preventing said stylus bar from moving in any direction except about said spring as an axis.

4. In a sound box for talking machines the combination with a stylus bar, a support having arms fitting against opposite sides of said stylus bar, a torsional spring passing through said stylus bar and said arms and means to adjustably hold said spring in said arms and said stylus bar to said spring.

5. In a sound box a torsional spring, a stylus bar and a support engaging opposite sides of said stylus bar, said torsional spring being incased throughout its entire length by said stylus bar and said support.

6. In a sound box the combination with a stylus bar of a torsional spring passing through said stylus bar, and a fixed support for said spring, said support being provided with faces which snugly fit against the opposite sides of said stylus bar.

7. In a sound box a stylus bar, a mounting for said stylus bar comprising a U-shaped block having its extremities engaging opposite sides of said stylus bar, and a torsional spring passing through said block and through said stylus bar and rigidly confined within each of said parts.

8. In a sound box a stylus bar, a support, a torsional spring comprising a pin rigidly connected to said stylus bar at its central portion and having its outer ends rigidly mounted in said support, the torsional portion of said spring being in contact for its entire length with said stylus bar and support.

9. In a sound box the combination with a stylus bar of bearings therefor; a spring passing through said stylus bar and said bearings, means to secure said spring to said stylus bar and to said bearings, said stylus bar fitting snugly between said bearings.

10. In a sound box for talking machines the combina-

tion with a stylus bar of a support having arms engaging opposite sides of said stylus bar, a torsional spring comprising a wire passing through said arms and said stylus bar, means for holding said wire rigidly within said bearings and means for rigidly holding said stylus bar on said spring.

11. In a sound box for talking machines a stylus bar and a support therefor, said stylus bar and support being provided with alined openings and a torsional spring snugly fitting within said openings and means to secure said spring to said support and to said stylus bar.

12. In a sound box for talking machines a stylus bar, a support engaging opposite sides of said stylus bar, said stylus bar and support being provided with alined circular openings, a round torsional spring inserted within said openings and snugly fitting the same, means to rigidly secure the ends of said spring within said support and means to secure said stylus bar to said spring midway between the ends thereof.

13. In a sound box for talking machines, the combination of a stylus bar with a recessed stylus bar support, the said recess and said stylus bar having flat sides engaging each other, each of said sides being disposed in a plane parallel to the plane of oscillation of the stylus bar and a torsional spring passing transversely through said sides, the said spring being in rigid engagement with said bar and support.

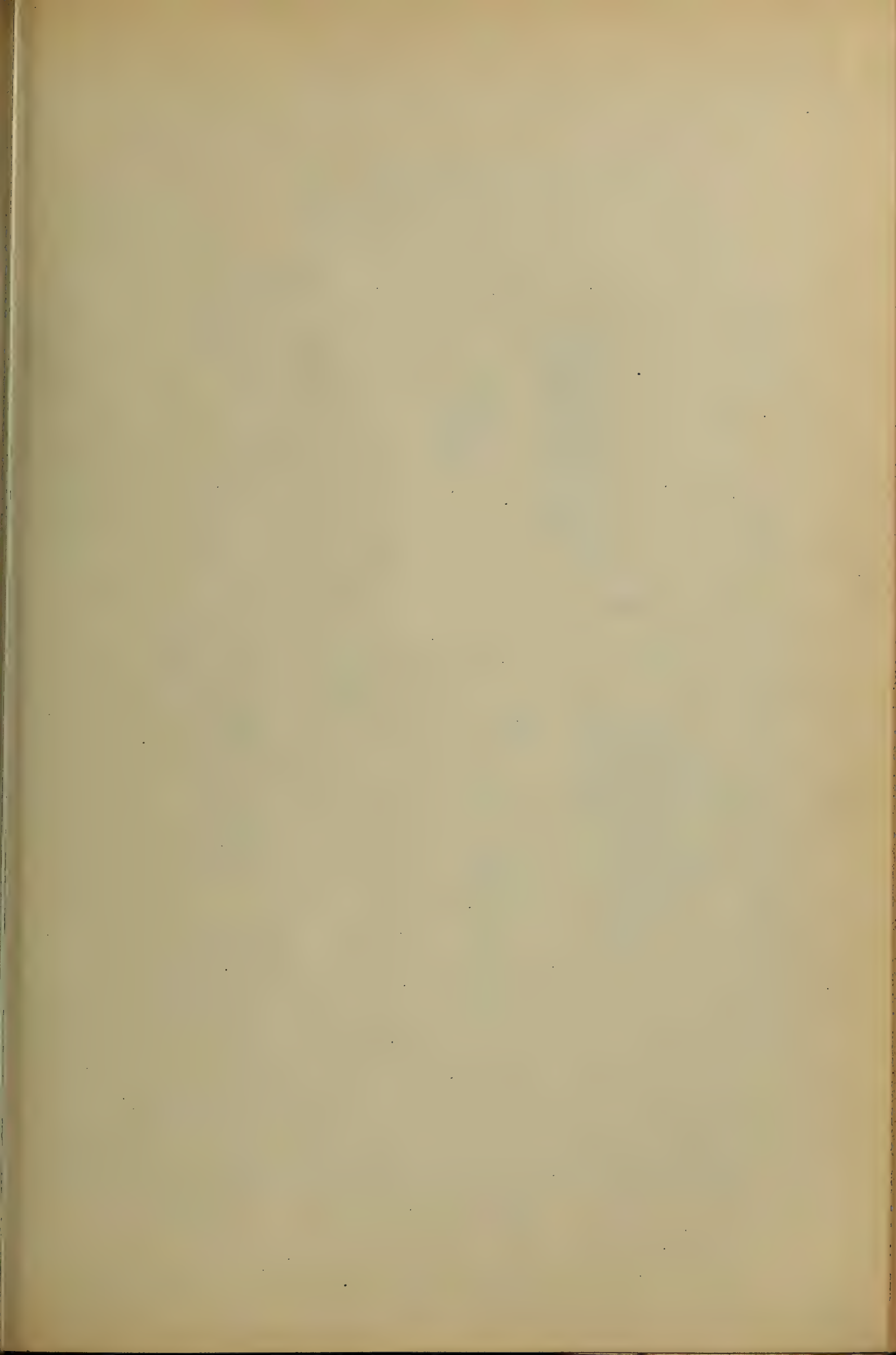
14. In a sound box for talking machines, the combination of a stylus bar with a recessed stylus bar support, the said recess and said stylus bar having flat sides engaging each other and disposed in a plane parallel to the plane of oscillation of the stylus bar, a torsional spring passing transversely through said sides and means for adjustably engaging said spring with said stylus bar and with said support.

In witness whereof, I have hereunto set my hand this seventh day of March, A. D. 1906.

LEON F. DOUGLASS.

Witnesses:

ALSTON B. MOULTON,
ALEXANDER PARK.

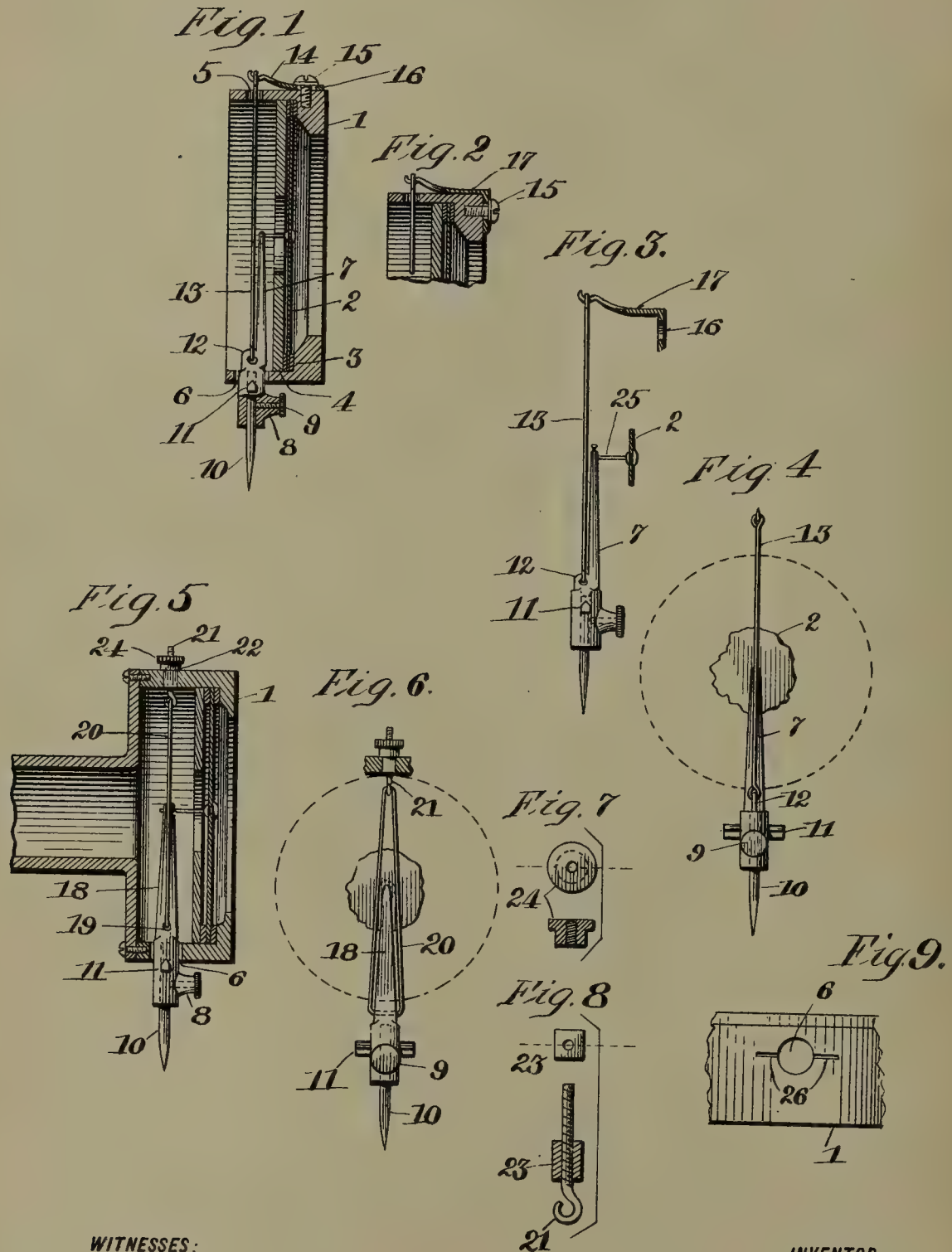


No. 865,105.

PATENTED SEPT. 3, 1907.

E. R. JOHNSON.
SOUND BOX FOR TALKING MACHINES.

APPLICATION FILED APR. 7, 1903.



WITNESSES:
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Edw. W. Vaile.

INVENTOR
Eldridge R. Johnson
BY
Home P. Peters
ATTORNEY.

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX FOR TALKING-MACHINES.

No. 865,105.

Specification of Letters Patent.

Patented Sept. 3, 1907.

Application filed April 7, 1903. Serial No. 151,453.

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a full, clear, and complete disclosure.

My invention relates to sound boxes for talking machines, and more particularly to novel means for mounting the stylus bar of such a sound bar, having for its object to provide a mounting that will make the box extremely sensitive to accurately reproduce the recorded vibrations, as will be hereinafter fully described and claimed.

For a full, clear and exact description of the particular construction I have selected to illustrate my invention reference may be had to the following specification and to the accompanying drawing forming a part thereof in which

Figure 1, is a sectional elevation of a portion of my improved sound box showing the stylus bar and its connection in position therein; Fig. 2 a sectional view of a slight modification of the means for producing an elastic tension; Fig. 3, a detail view of the stylus bar and its suspension detached from the sound box; Fig. 4 a front elevation of Fig. 3; Fig. 5 a sectional elevation of a modified form of the means for producing a tension upon the stylus bar; Fig. 6 a front elevation of the stylus bar and its connecting parts, shown in Fig. 5, detached; Figs. 7, and 8, show means for varying the tension upon the suspension shown in Figs. 5 and 6 and Fig. 9, a view showing a portion of the edge of the sound box.

The numeral 1 indicates the sound box casing which has the usual diaphragm 2 yieldingly mounted therein and retained in position in any suitable manner such as by the flange 3 and the perforated disk 4.

The sound box casing 1 is provided at substantially diametrically opposite points with holes or openings 5 and 6. The lower opening 6 is somewhat larger than the opening 5 and is adapted to receive the stylus bar 7 so that the latter may have a slight lateral play therein.

The stylus bar 7 is provided with the usual boss 8 which is adapted to receive the set screw 9 for retaining the needle or stylus in position. The stylus bar 7 is also provided with a knife edge or pivot 11 which is adapted to engage the outer surface of the sound box and have a bearing thereon. Small cuts or recesses 26 are provided to receive the knife edge on the surface of the sound box adjacent the opening 6. The stylus bar 7 is also provided with an eye or socket 12 which is adapted to receive one end of the wire or elastic suspension 13. The other end of wire or suspension 13 passes through the opening 5 in the sound box casing and engages a spring hook 14 which is re-

tained in position upon the outside of the sound box casing by means of a screw or similar device 15, the engagement between said wire or suspension 13 and hook 14 being to one and the same side of the bearing of the bar 7, as the engagement between said suspension 13 and the said bar. The plate or material of which said hook is formed is provided with an elongated slot 16 for allowing of an adjustment of the hook in relation to the screw 15. The hook 14 may be substantially straight as shown in Fig. 1 or may be bent at an angle and attached to the front of the sound box as illustrated in Figs. 2 and 3.

It will now be seen that the knife edge 11 is forced into contact with the surface of the sound box by means of the suspension 13 and the tension placed upon the latter may be varied according to the elasticity and position of the hook 14 or of the hook 17. The latter is so designed that the said tension will be such as to produce the best results in relation to the character of the sound record and after the parts are placed in position the hook 14 or 17 may be adjusted within certain limits.

In Figs. 5 to 8 inclusive I have illustrated another form of my improved means for retaining the stylus bar in position. The stylus bar 18 is provided with knife edges 11 similar to those above described but instead of having an eye or socket 12 a hole 19 is placed in the stylus bar 18 substantially in line with the knife edge 11 through which the suspension 20 is adapted to pass. This suspension 20 consists of a continuous loop of wire or other strong material which passes through the hole 19 and is adapted to engage the hook 21 which passes through an opening 22 diametrically opposite the opening 6 through which the stylus bar passes, the engagement between said suspension 20 and hook 21 being also located to one and the same side of the bearing of the bar 18, as the engagement between said suspension and bar. The opening 22 is preferably square in cross section and is adapted to carry a square plug 23 which is attached to the hook 21. A thumb nut 24 permits a longitudinal adjustment of the hook 21 so that the tension upon the suspension 20 may be varied after the parts are in position in a manner similar to that above described in connection with the first form.

The upper end of the stylus bar is, of course, in each case connected to the diaphragm 2 by means of the wire or similar device 25. In either form the suspensions 13 or 20 are slightly elastic under tension, or in other words, act as springs and allow of a lateral vibration of the stylus bars.

It will be seen that by the constructions set forth in the forms above described that the movable parts of the sound box are very easily assembled efficiently retained in position and may be very accurately adjusted to give the best results in the production or reception of sound waves.

Having thus described my invention, what I claim and desire to protect by Letters Patent in the United States, is:

1. In a sound recording and reproducing machine, the
5 combination with a sound box casing of a diaphragm, a stylus bar, a transverse bearing located on the exterior of the sound box casing, said bearing holding said stylus bar against longitudinal movement in one direction, the said stylus bar having an opening adjacent said bearing, an
10 elastic suspension loop passing through said opening, and means at the opposite side of the casing for adjustably supporting said loop.
2. In a sound recording and reproducing machine, the
15 combination with a sound box casing of a diaphragm, a stylus bar having a transverse bearing journaled on the exterior of the sound box casing, an elastic suspension loop passing through an opening in said stylus, and a screw threaded hook at the opposite side of said casing for adjustably supporting said loop.
- 20 3. In a sound box for talking machines, a casing having a diaphragm, a stylus bar projecting through an opening in said casing and having a transverse bearing journaled on the exterior of said casing, an elastic suspension loop

passing through an opening in said stylus bar within the sound box casing, and between the limbs of which said stylus bar is situated, a screw threaded hook at the other end of said loop, the screw threaded portion of said hook passing through an opening on outside of the sound box casing opposite that through which the stylus bar projects, and an adjusting nut situated on the outside of the casing and engaging said screw threaded portion of the hook. 25 30

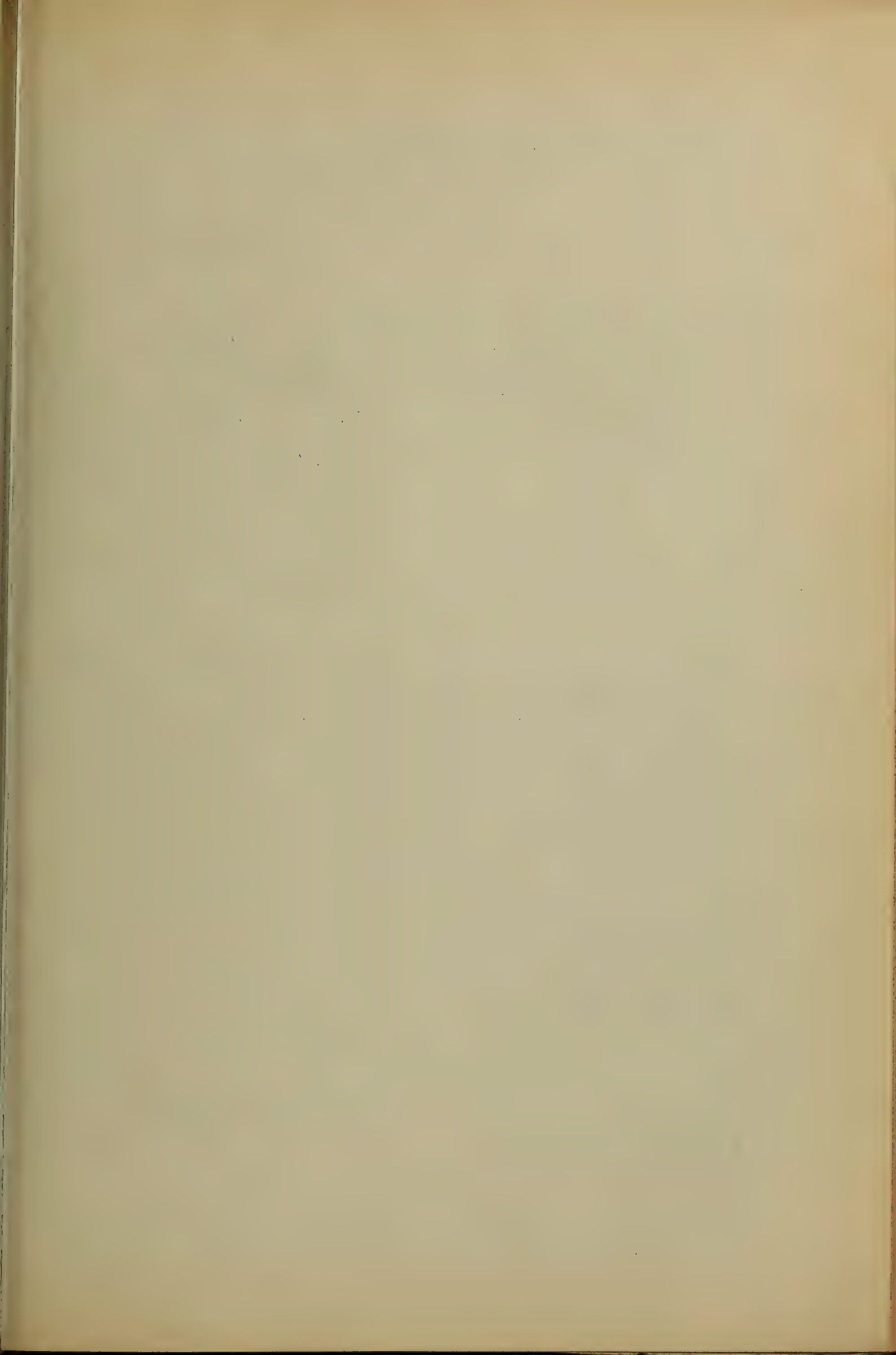
4. In a sound box recording and reproducing machine, the combination with a sound box casing of a diaphragm, a stylus bar, an axial bearing located on the exterior of the sound box casing, the said bearing holding said stylus bar against longitudinal movement in one direction, a suspension wire passing through an opening in said stylus bar adjacent said bearing, said wire tensioning said bearing against said casing, and means at the opposite side of the casing for adjustably supporting said wire. 35 40

In witness whereof, I have hereunto set my hand this 30th day of March, A. D. 1903.

ELDRIDGE R. JOHNSON.

Witnesses:

LESTER L. BRISTOL,
ROSE CHEVALIER.



No. 865,344.

PATENTED SEPT. 3, 1907.

A. T. MOORE.
MULTIPLE GRAMOPHONE.
APPLICATION FILED SEPT. 11, 1903.

Fig. 1

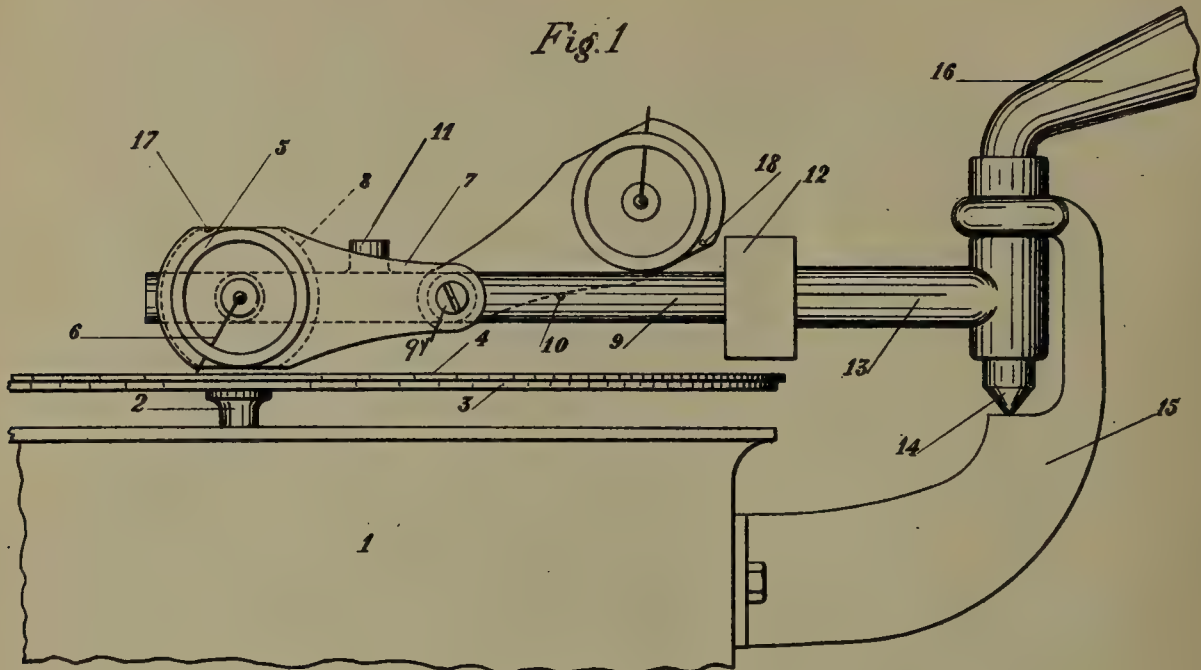
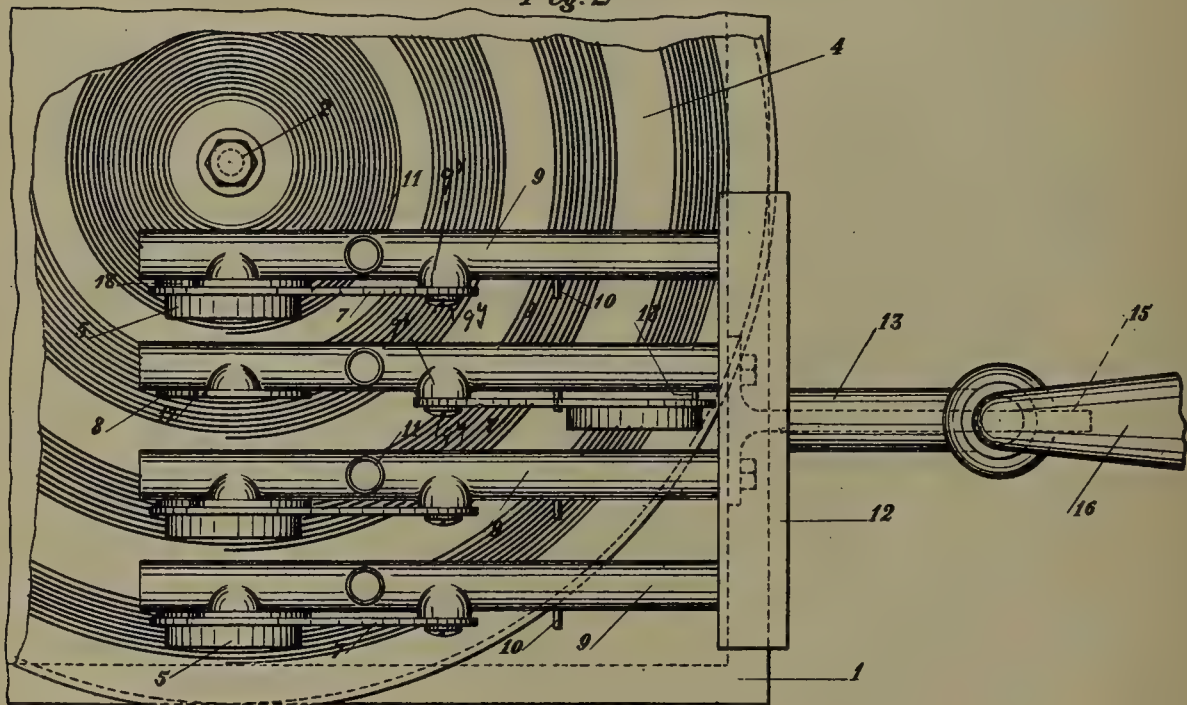


Fig. 2



WITNESSES:

S. M. Jones
C. W. Winchester

Alexander T. Moore INVENTOR.

UNITED STATES PATENT OFFICE.

ALEXANDER T. MOORE, OF NEW ORLEANS, LOUISIANA.

MULTIPLE GRAMOPHONE.

No. 865,344.

Specification of Letters Patent.

Patented Sept. 3, 1907.

Application filed September 11, 1903. Serial No. 172,811.

To all whom it may concern:

Be it known that I, ALEXANDER THOMAS MOORE, a citizen of the United States of America, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Multiple Gramophones, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to a multiple gramophone and particularly to a structure employing a plurality of sound boxes in connection with a single reproducing disk.

The invention has for an object to provide means whereby a plurality of sound boxes may be used either independently, or conjointly in connection with a single horn.

A further object is to provide means whereby the sound boxes may be thrown in or out of operative position relative to the conducting tubes upon which they are supported.

Other and further objects and advantages of the invention will be hereinafter set forth and the novel features thereof defined by the appended claims.

In the drawing Figure 1 is a side elevation of the invention, and Fig. 2 a top plan thereof.

Like numerals of reference indicate like parts in the several figures of the drawing.

The numeral 1 designates a casing or box provided with a driving shaft 2 carrying a disk 3 upon which the record 4 is placed. This casing is also provided with a bracket arm 15 having a suitable bearing for a conducting tube 13 which is connected at its end next the disk with a collecting chamber 12. The outer end of the tube 13 is formed with a vertical extension having a bearing portion 14 at its lower end, while at its upper end a horn 16 may be applied as shown in Fig. 2. Projecting laterally from the chamber 12 is a series of tubes 9 each provided with a face plate 8 conforming to the outline of a sound box 5 with which it contacts when the latter is lowered to bring the needle 6 carried thereby into contact with the record 4 upon the disk. These tubes 9 also carry a stop pin 10 to limit the backward travel of the plates 7 carrying the boxes 5 when the latter are moved out of operative position. The plate 7 is pivotally mounted upon each tube 9 by the screw 9^x entering the boss 9^x upon the tube. Upon the inner face of each plate 7 a pin 18 is provided and adapted to seat in a slot 17 provided in the face plate 8. Each tube 9 is also formed with an apertured nipple 11 to which a horn similar to that shown at 16 may be applied if desired.

It will be observed from the foregoing that a series of needles and their sounding boxes may be employed for engagement with a single record for the purpose of causing the simultaneous reproduction of the various parts of the music thus securing a clearer, more accurate and efficient reproduction of the recorded sounds than can be secured by a single sound box. The construction also permits the conduction of the sounds from the separate boxes through the chamber into a single horn.

It will be obvious that changes may be made in the details of construction and configuration without departing from the spirit of the invention as defined by the appended claims.

The sound boxes are adapted to engage independent grooves of the record tablet at different distances from the center thereof and do not follow each other in the same groove. This adapts the device for use in connection with a tablet having a series of circumferentially disposed records thereon which may be thus simultaneously reproduced.

What I claim is:—

1. A device of the class described comprising a disk record tablet provided with independent record grooves thereon, a plurality of sound conveying tubes mounted upon a single pivot, and sound boxes carried by said tubes at different distances radially to the axial center of the tablet to engage independent record grooves on said tablet.

2. A device of the class described comprising a disk record tablet, a plurality of parallel sound conveying tubes mounted upon a single pivot, and sound boxes carried by said tubes at different distances radially to the axial center of the tablet to engage independent record grooves on said tablet and be thereby simultaneously fed across the tablet.

3. A device of the class described comprising a disk record tablet, a plurality of sound conveying tubes of equal length, and sound boxes carried by said tubes to engage said record tablet at points on a radial line at different distances from its center.

4. In a device of the class described, a plurality of tubes, plates pivotally mounted thereon, sound boxes carried by the free ends of said plates, and a chamber connecting said tubes at one end.

5. In a device of the class described, a plurality of sound boxes mounted opposite apertures in said tubes, a chamber connecting said tubes, and a connection nipple thereon.

6. In a device of the class described, a plurality of tubes, a sound box mounted opposite an aperture in each tube, a chamber connecting said tubes at one end, a casing and driving disk, a bracket from said casing, a horn supported by said bracket, and a connecting tube from the horn to said chamber.

7. In a device of the class described, a casing, a bracket secured thereto, a pivoted tube mounted upon said bracket, a chamber secured to the end of said tube, parallel con-

ducting tubes projecting from said chamber, plates pivoted to said conducting tubes, a sounding box carried by each plate, a stop upon each conducting tube to limit the travel of said plate in one direction, and means to support a record adjacent to said box.

5 8. The combination with a sound record disk provided with independent duplicate records disposed concentric and relative to each other, of means mounted upon a single pivot and provided with a plurality of sound boxes dis-

posed at different distances from the center of the disk to 10 independently engage said records and be simultaneously fed thereby across said tablet.

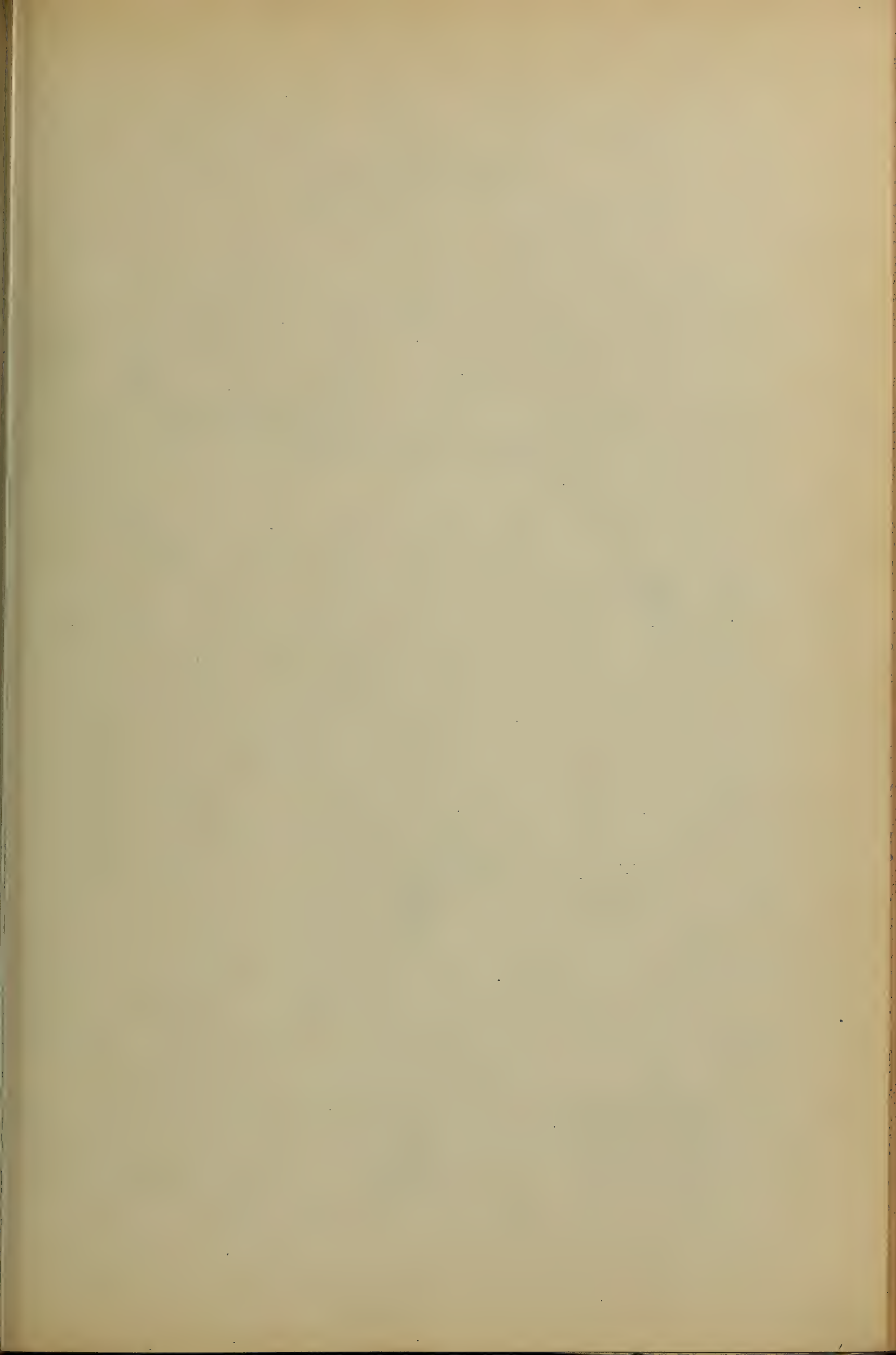
In testimony whereof I affix my signature in presence of two witnesses.

ALEXANDER T. MOORE.

Witnesses:

J. B. ROSSER, Jr.,

ALPHONSE J. CUNEO.



No. 865,398.

PATENTED SEPT. 10, 1907.

H. KOCH.

TALKING MACHINE ATTACHMENT.

APPLICATION FILED JAN. 8, 1906.

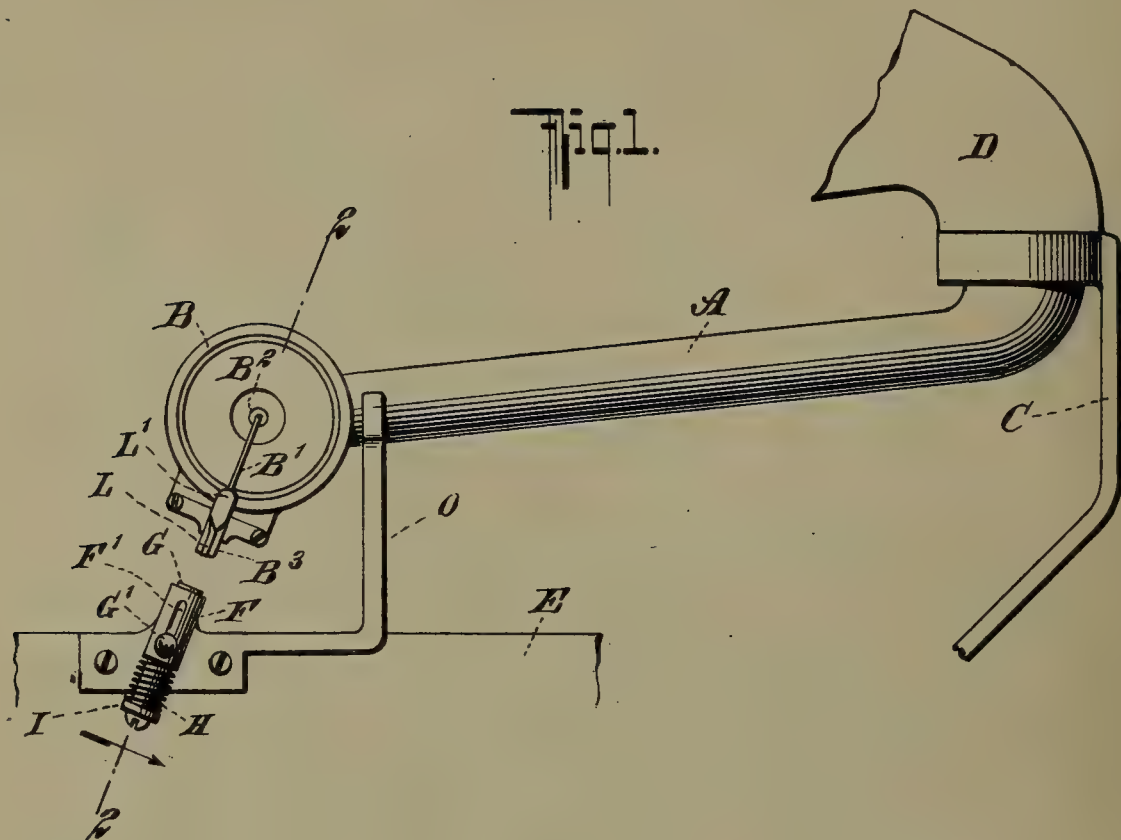
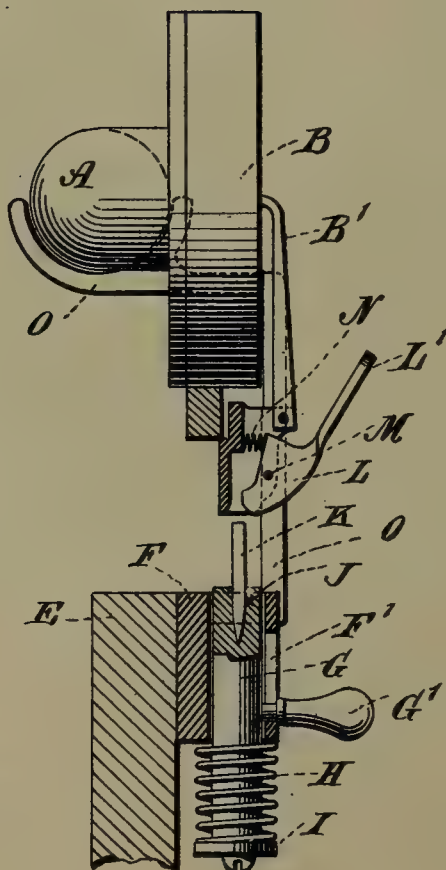


Fig. 2.



WITNESSES
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John Lotka.

INVENTOR
Henry Koch
BY
Briesen Thumant
ATTORNEYS

UNITED STATES PATENT OFFICE.

HENRY KOCH, OF RAHWAY, NEW JERSEY, ASSIGNOR TO THE REGINA COMPANY, OF RAHWAY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE ATTACHMENT

No. 865,398.

Specification of Letters Patent.

Patented Sept. 10, 1907.

Application filed January 8, 1906. Serial No. 295,022.

To all whom it may concern:

Be it known that I, HENRY KOCH, a citizen of the United States, and a resident of Rahway, county of Union, and State of New Jersey, have invented certain new and useful Improvements in Talking-Machine Attachments, of which the following is a specification.

My invention relates to the class of machines commonly known as talking machines and has for its object to provide machines of this description with a device for readily inserting the stylus into the stylus holder of the sound-box or reproducer.

My invention will be fully described hereinafter and the features of novelty will be pointed out in the appended claims.

Reference is to be had to the accompanying drawings in which

Figure 1 is a side view of as much of a talking machine as is necessary to illustrate my invention and Fig. 2 is a sectional view thereof on an enlarged scale taken on the line 2—2 of Fig. 1.

A represents the sound conducting tube which carries at its free end the usual reproducer or sound box B. The other end of said tube A is journaled in a bracket C which is secured in any convenient manner to the talking machine proper. This bracket C also carries the customary amplifying horn D which is in communication with the sound conducting tube A. The sound box B may be of any ordinary construction and is provided with the usual stylus arm B' secured to the diaphragm B² and carrying the stylus holder B³.

E represents a portion of the talking machine to which is secured in any convenient manner a guiding member F provided with a slot F'. A plunger G is arranged to slide in said guiding member F and is provided with an operating handle G' which extends through the slot F' of the member F. This slide or plunger G is maintained in its lower position by a spring H one end of which abuts against the guiding member F and the other end of which engages a washer I carried by the plunger G. The plunger G is provided with a receptacle or recess J of a tapering shape, so as to accommodate and hold the stylus K.

L is a holding catch pivoted at M to the stylus holder B³ and adapted to lock the stylus K in the holder B³. The catch L is provided with a finger piece L' and is held in its locking position by a spring N.

O is a positioning fork attached at a convenient point to the talking machine E and adapted to engage the sound-conducting tube A. The fork O may be made separate from or integral with the guiding member F as desired.

In operation to insert the stylus K in position in the stylus holder B³, the said stylus K is first placed in the receptacle J of the plunger G with its point down. The tube A is swung on its pivot in the bracket

C and then raised and placed in the fork O, it being understood that the tube A is so constructed as to be capable of swinging in a vertical as well as a horizontal plane. It is to be further understood that the fork O is arranged in a plane substantially at right angles with the plane of the sound-box and is so located that when the tube A is placed therein the stylus holder B³ will be directly over the receptacle J in the plunger G. In other words when the tube A is in the fork O one of the members of said fork will engage the tube A at the rear thereof and the other member of said fork will engage the tube at the front thereof and the stylus holder will register with the stylus K in the plunger G. The plunger G is then pressed upward through the medium of the handle G' and the stylus K inserted into the holder B³ where it is held by the holding catch L. The holding catch is beveled at its lower portion so that the stylus on being pressed upward will be guided into proper position. It is to be understood that the receptacle J of the plunger G is so proportioned that the stylus K will extend just far enough therefrom for correct positioning in the stylus holder. To aid in this the slot F' is also in correct proportion. After the selection has been played on the machine and a new stylus is desired the finger piece L' of the catch L, is pressed toward the sound box thus releasing the stylus just used and the above operation is repeated.

With my device a new stylus may be quickly inserted in the stylus holder and the danger of pricking the fingers is done away with. It is to be understood that instead of the positioning fork O an ordinary stop may be used, the only requirement being that the sound conductor or tube A be stopped at a point where the stylus holder is in registry with the receptacle in the plunger G.

Various modifications may be made without departing from the nature of my invention as defined in the claims.

I claim and desire to secure by Letters Patent:

1. In a talking machine, the combination of a movable sound-conducting tube, the sound box carried thereby and the stylus-holder on the sound box, with a support in permanent engagement with said sound-conducting tube, another support adapted for temporary engagement with said sound-conducting tube and a stylus-inserting device which registers with the stylus-holder when the sound-conducting tube is in temporary engagement with the second-named support.

2. In a talking machine, the combination of the pivotally supported sound-conducting tube, the sound-box carried thereby, and the stylus-holder on the sound-box, with a support for holding said tube in its inactive position, and a stylus-inserting device which registers with said holder when the sound-conducting tube rests on said support.

3. In a talking machine, the combination with the movable sound conductor, a sound box carried thereby and a

stylus holder on said sound box, of a positioning device arranged in a plane at an angle to the plane of the sound box and provided with two members adapted to engage the sound conductor at the front and rear thereof when the
5 sound box is in the stylus-receiving position and a stylus inserting device which registers with the stylus-holder when the sound box is positioned by said positioning device.

4. In a talking machine, the combination, with the movable sound-box having a stylus-holder, of a plunger mov-

able toward and from the holder and in registry therewith in a predetermined position of the sound-box, the said plunger being provided with a tapering recess or socket for temporarily holding a stylus.

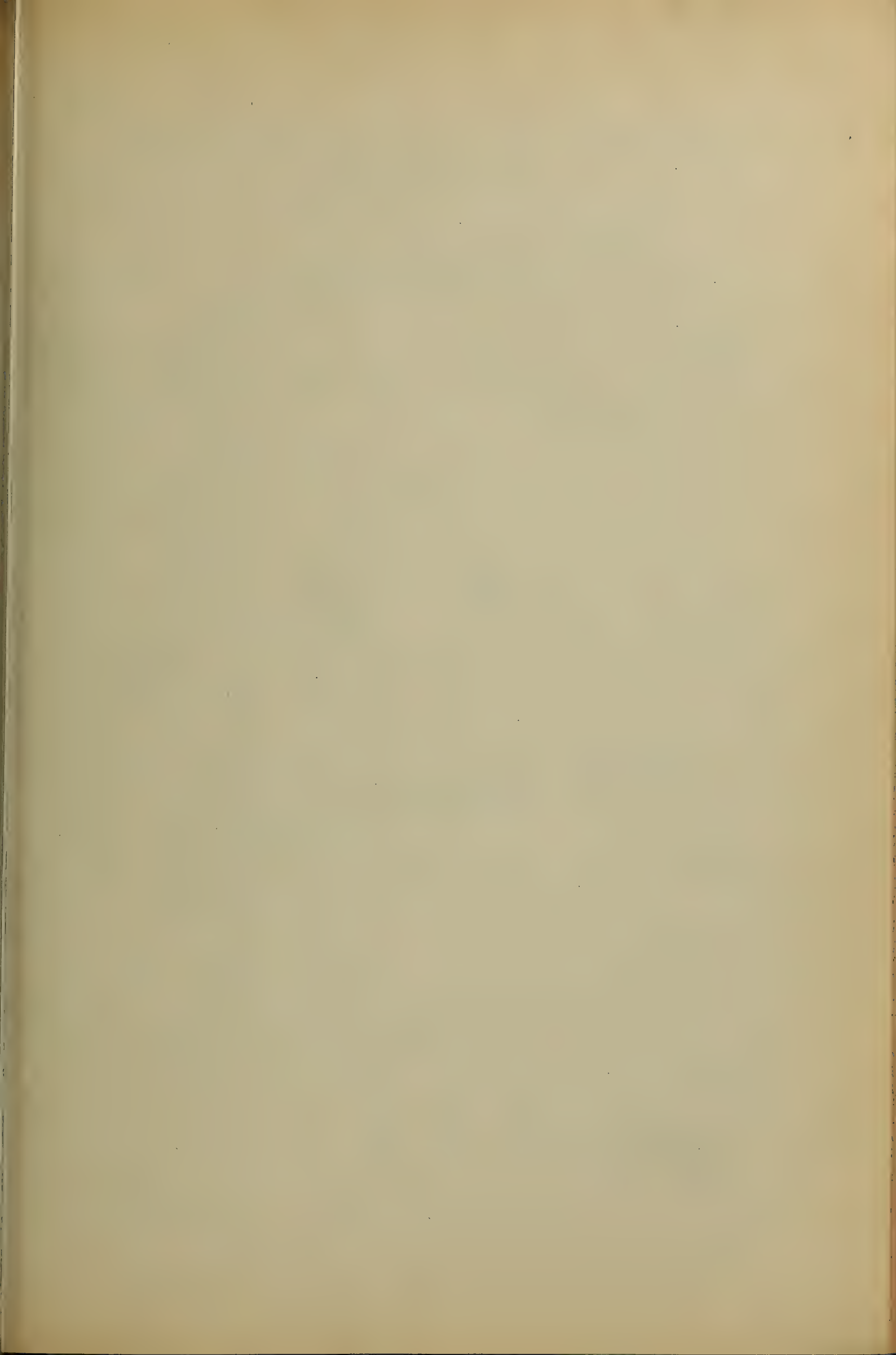
In testimony whereof, I have hereto subscribed my name 15
in the presence of two subscribing witnesses.

HENRY KOCH.

Witnesses:

W. C. PROSS,

F. J. MACDONALD.



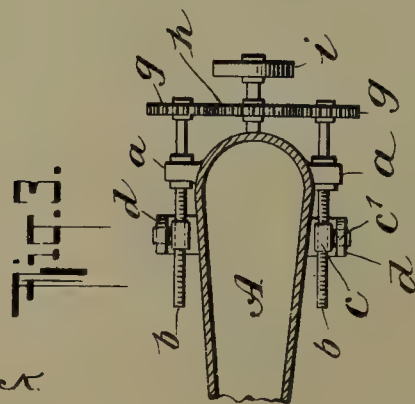
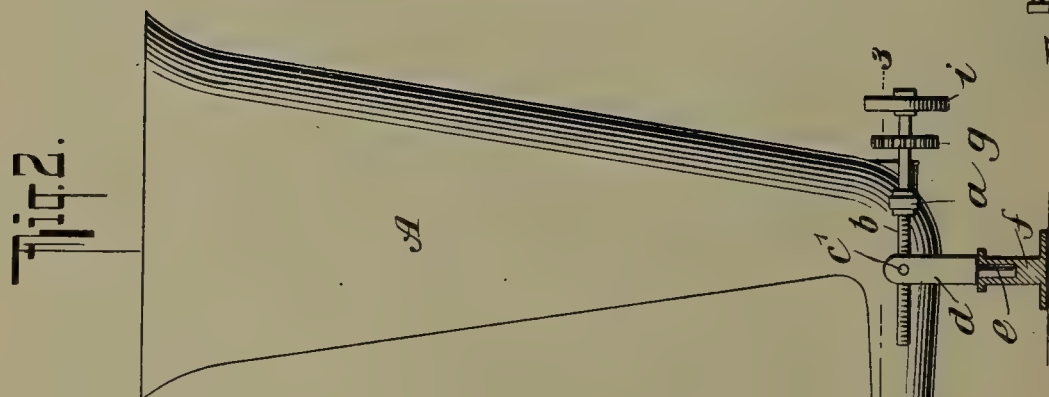
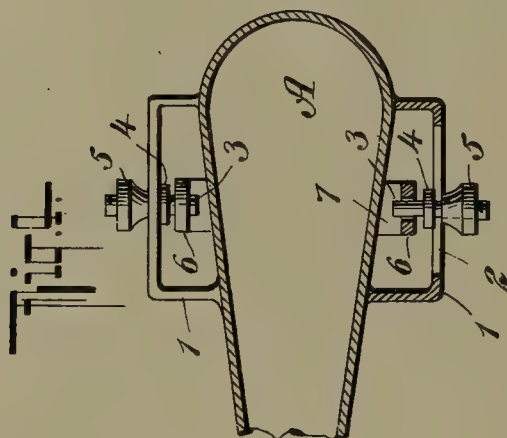
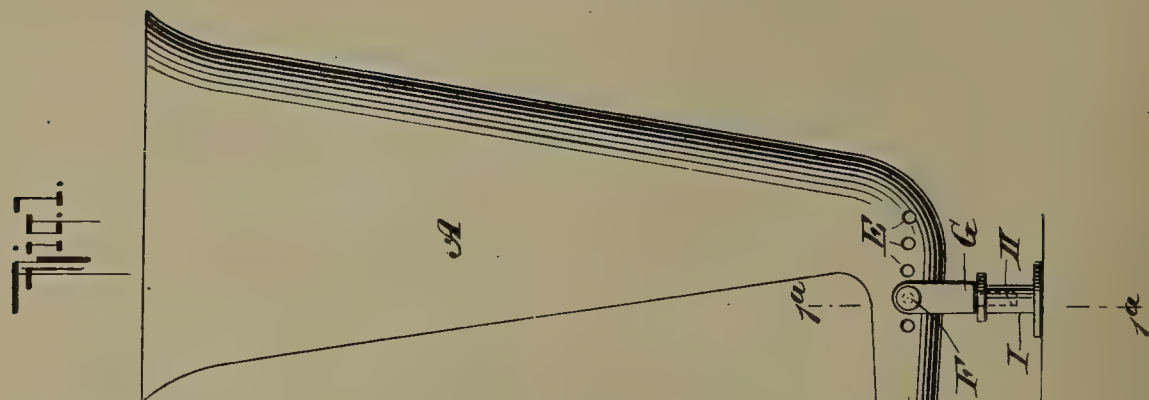
No. 865,399.

PATENTED SEPT. 10, 1907.

H. KOCH.

TALKING MACHINE HORN.

APPLICATION FILED MAY 1, 1906.



WITNESSES
Julius H. Schutz
John A. Kellumbeck

INVENTOR
Henry Koch
 BY
Brisson & Smith
 ATTORNEYS

UNITED STATES PATENT OFFICE.

HENRY KOCH, OF RAHWAY, NEW JERSEY, ASSIGNOR TO THE REGINA COMPANY, OF RAHWAY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE HORN.

No. 865,399.

Specification of Letters Patent.

Patented Sept. 10, 1907.

Application filed May 1, 1906. Serial No. 314,707.

To all whom it may concern:

Be it known that I, HENRY KOCH, a citizen of the United States, and a resident of Rahway, Union county, State of New Jersey, have invented certain new and useful Improvements in Talking-Machine Horns, of which the following is a specification.

My invention relates to horns for talking machines and has for its object to provide a means for pivotally supporting said horn, which means is adjustable so as to vary the distance between the pivot and the reproducer or sound box.

My invention will be fully described hereinafter and the features of novelty will be pointed out in the appended claims.

Reference is to be had to the accompanying drawings in which

Figure 1 is an elevation of as much of a talking machine as is necessary to illustrate my invention; Fig. 1^a is a section thereof on line 1^a—1^a of Fig. 1; Fig. 2 is an elevation of another form of my device; Fig. 3 is a horizontal section thereof on the line 3—3 of Fig. 2, and Fig. 4 is a horizontal section of still another form of my invention.

Referring to the construction shown in Fig. 1, A is the sound-conduit or amplifying horn which may be of any usual construction and which carries the customary reproducer B, having a stylus C in engagement with the record D. The said record may be supported and rotated in any convenient manner. The horn A is provided on each side with diametrically opposite sets of holes E arranged at different distances from the end which carries the reproducer and adapted to receive the pointed ends of screws or other pivoting devices F. These screws F pass through a fork G near the upper ends thereof, said fork straddling a portion of the said horn. The lower end of the fork G is connected with a stem H, which enters a bearing I, so that the said fork is rotatable about a vertical axis, the whole forming a support for the horn. It will be seen that with this construction the distance from the reproducer B to the pivot screws F may be varied; this is done for the purpose of regulating the weight or pressure of the reproducer on the record, since with many machines an arrangement is made for using different reproducers which are not alike in weight.

In the form of my invention shown in Figs. 2 and 3 I provide for a gradual adjustment of the horn pivot in the following manner. The horn A is provided at each side with lugs or projections *a* through which screws *b* pass loosely. These screws *b* also pass through screw threaded blocks *c* which are pivoted at *c'* to the upper

ends of the fork *d* having a stem *e* in engagement with the bearing *f* in the same manner as described with regard to the construction shown in Fig. 1. The screws *b* carry pinions *g* each of which is in mesh with a central pinion *h*. This pinion *h* is journaled on a convenient portion of the horn A and is provided with a milled operating knob *i*. Thus as this knob *i* is turned one way or the other the screws *b* will be rotated through the medium of the pinion *g* and the end of the horn carrying the reproducer will be brought nearer to or further away from the pivot blocks *c* as desired.

In the construction shown in Fig. 4 the horn A is provided with outwardly extending frames *l* having slots 2. Pivot pins 3 having collars 4 project through these slots 2 and are screw-threaded at one end to receive thumb screws 5. The opposite ends of these pivot pins project into suitable openings 6 in the fork 7 which may be of the same general construction as described hereinbefore. By loosening the thumb-screws 5, the horn may be moved along the pivot pins 3 so as to vary the distance from the reproducer to said pivot pins. It is of course to be understood that the collars 4 form part of or are secured to the pins 3 so that as the thumb-screws are again screwed up the pins 3 and consequently the horn will be secured in the adjusted position.

Various modifications may be made without departing from the nature of my invention as defined in the claims.

I claim:

1. The combination of a reproducer carrying horn, a member having a pivot for said horn, the axis of which pivot intersects the said horn, a supporting member with which said first named member is connected by a joint allowing a swinging motion about an axis corresponding to the progressive motion of the horn during operation, provision being made to permit the position of said horn to be changed on said first named member to vary the distance between the reproducer and the pivot of the said horn.

2. The combination of a reproducer-carrying sound conduit, a support having a pivot for said conduit, the axis of which pivot intersects the sound conduit, and means adapted to permit the position of the said sound conduit to be changed on said support to vary the distance between the reproducer and the said support.

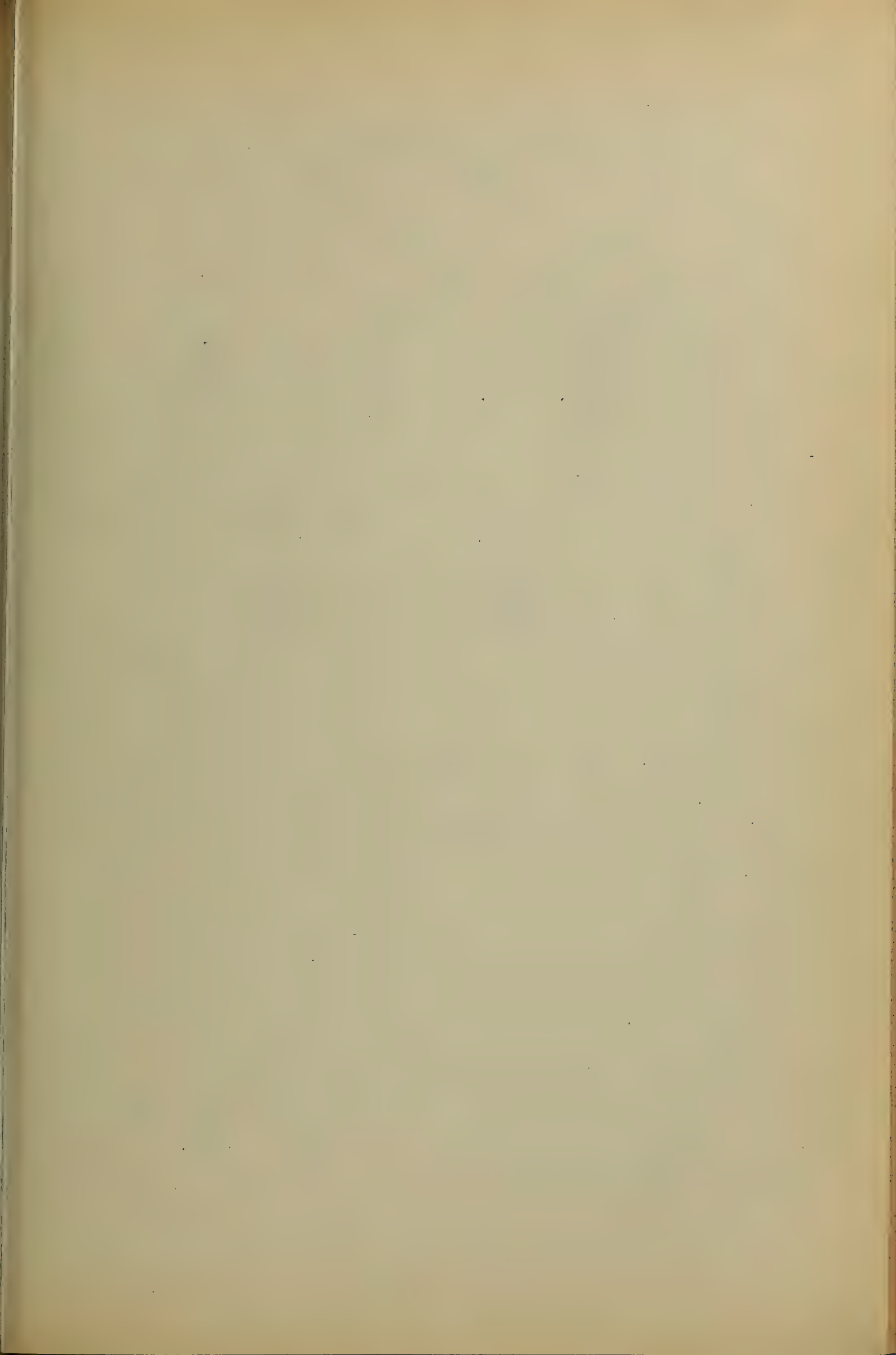
3. The combination of a reproducer carrying sound conduit, a jointed support having a pivot for said sound conduit, the axis of which pivot intersects the sound conduit, and means adapted to permit the position of said sound conduit to be changed on said support to vary the distance between the reproducer and the support.

In testimony whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

HENRY KOCH.

Witnesses:

JAMES D. LUTHER,
F. J. MACDONALD.



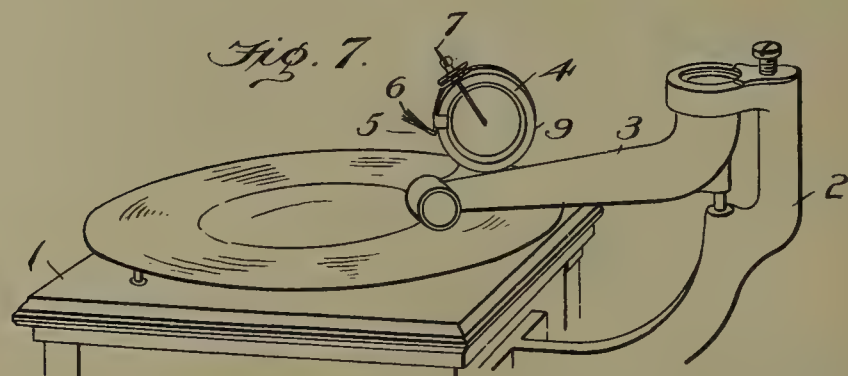
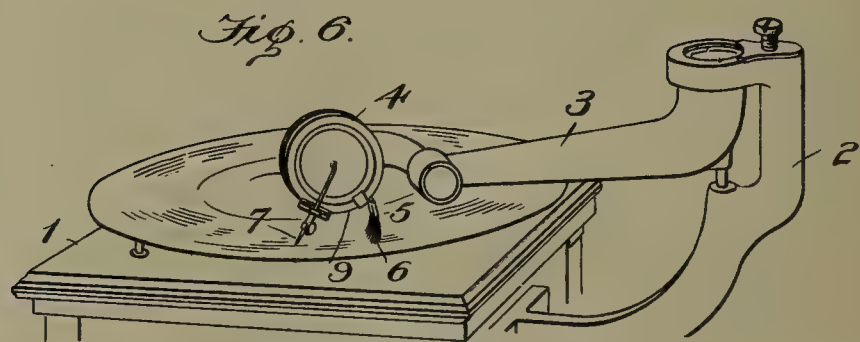
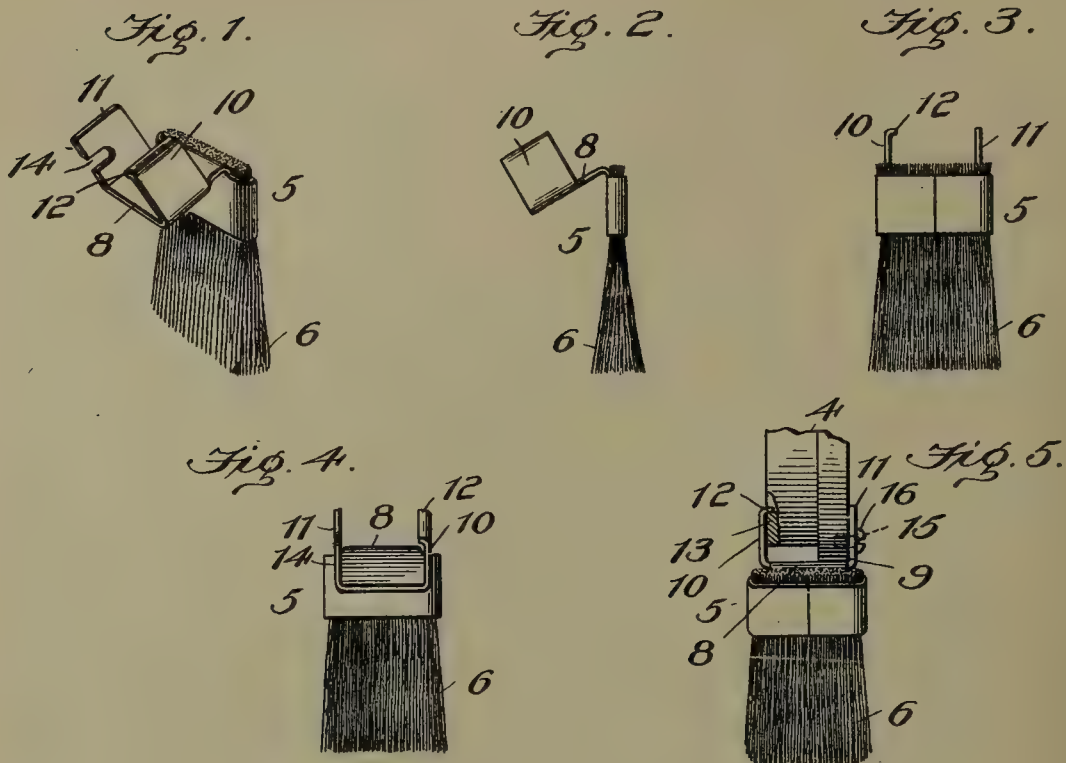
No. 865,674.

PATENTED SEPT. 10, 1907.

J. N. BLACKMAN.

CLEANING ATTACHMENT FOR SOUND RECORDS.

APPLICATION FILED AUG. 22, 1906.



Witnesses

Edwin L. Bradford
H. H. Byrne

Inventor

Joseph Newcomb Blackman

By Meyers, Cushman & Rea

Attorneys

UNITED STATES PATENT OFFICE.

JOSEPH NEWCOMB BLACKMAN, OF EAST ORANGE, NEW JERSEY.

CLEANING ATTACHMENT FOR SOUND-RECORDS.

No. 865,674.

Specification of Letters Patent.

Patented Sept. 10, 1907.

Application filed August 22, 1906. Serial No. 331,578.

To all whom it may concern:

Be it known that JOSEPH NEWCOMB BLACKMAN, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, has invented new and useful Improvements in Cleaning Attachments for Records of Sound-Reproducing Instruments, of which the following is a specification.

My invention relates to means for cleaning the records of sound-reproducing instruments, such as phonographs, graphophones, and the like, and is more especially adapted for disk-record machines.

It has for its purpose to provide a cleaning-implement adapted to this type of instrument, having means whereby it may be easily assembled in operative relation to the record-disk and removed therefrom when desired. In the practical use of such disk-record, sound-reproducing instruments objection exists that the reproduction is clouded; that is, it is not as clear and distinct as it should be, and this difficulty arises because of the fact that the sound grooves are not perfectly clean, small dust particles collecting therein. Very slight particles of dust in the grooves detract materially from the clearness of the sound reproduction, and so far as I am aware this difficulty has never heretofore been taken care of in disk-record instruments.

My invention consists in a cleaner adapted to be supported in operative relation to the record disk, as hereinafter described.

That which I regard as new will be set forth in the clauses of claim appended to the description.

In the accompanying drawing illustrating that which I regard as the best known embodiment my invention—Figure 1 is a perspective view of the cleaning implement; Fig. 2 a side elevation thereof; Fig. 3 a front elevation thereof; Fig. 4 a rear elevation; Fig. 5 illustrates the same connected to the sound-box of the instrument; Fig. 6 a perspective of a disk-record, sound reproducing apparatus with the cleaning-implement in operative relation to the record; and Fig. 7 a similar view showing the sound-box and the cleaning-implement attached thereto shifted to inoperative position.

In said drawing the reference numeral 1 designates the record-support; 2 a standard in which is mounted the swinging sound-box carrier-arm 3, which is adapted to be swung over the disk-record to support the sound-box and the needle carried thereby in operative relation to the disk-record when the instrument is in use, and to be swung away therefrom to permit the insertion and removal of records. The sound-box 4 has a pivotal connection with the supporter-arm 3 whereby it may be swung to the position shown in Fig. 7 prior

to swinging the supporter-arm away to permit the introduction or removal of a record, so that in the swinging movement the needle will not traverse the record and whereby it may be swung down to the position shown in Fig. 6 when the instrument is in operation.

Supported by the sound-box is the cleaning instrument 5 which, preferably, consists of a camel-hair brush 6, provided with means of attachment to the sound-box, although the actual material of the cleaner may be various, such as felt or other suitable material. As shown, the cleaning-implement is attached to the sound-box and moves in sweeping contact with the record disk in advance of the reproducing needle 7 and serves to effectually clean out the sound grooves so that the needle has perfect contact and a clear and distinct sound reproduction is secured.

The cleaning brush or implement is provided, as stated, with means whereby it may be secured in operative position to the sound-box. This means, as shown, consists of a base-member 8 extending laterally from the top of the brush to bear against the circumferential face 9 of the rim of the sound-box and arms 10, 11 at the opposite ends of the base-member which embrace the sound-box rim, one of which arms is provided with an inwardly turned finger 12 to take over the annular flange 13 of the rim, and the other arm is provided with a recess 14 to take over the stem of one of the screws 15 which pass through the sound-box and the head 16 of which, when screwed home, engages the said arm 11, thus confining the cleaning-implement securely in place.

The device may be readily attached by simply loosening-up the screw 15 and fitting the inturned end 12 of the arm 10 over the annular rim-flange 13 of the sound-box and then slipping the slot in the arm 11 over the screw 15 and turning the screw home. For removal the operation described is reversed.

It will thus be seen that the cleaning-implement is provided with a very simple means whereby it may be connected to the sound-box in operative relation to the disk-record.

The cleaning-implement of my invention serves to thoroughly clean the grooves and a clear and distinct reproduction is secured. The device is a simple one and easily attachable and detachable.

Having thus described the invention, what I claim is—

1. In a sound-reproducing instrument, a cleaning-implement comprising cleaning-material and attaching means consisting of arms adapted to embrace the sound-box, one of such arms having an inturned end and the other a slot.

2. In a sound reproducing instrument, a cleaning-implement comprising cleaning-material and attaching means consisting of arms adapted to embrace the sound-box, one of such arms having an inturned end and the other a slot, and a base extending between said arms and adapted to bear against the sound-box.

3. A cleaning-implement for the records of sound-reproducing instruments comprising cleaning-material and attaching means consisting of arms adapted to embrace the

sound-box, one of such arms having an inturned end and the other a slot, and a base extending between said arms and adapted to bear against the sound-box. 10

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOSEPH NEWCOMB BLACKMAN.

Witnesses :

R. B. CALDWELL,

FRANK ROBERTS.

No. 865,435.

PATENTED SEPT. 10, 1907.

W. SCHUBERT.
REPRODUCER FOR PHONOGRAPHS.
APPLICATION FILED SEPT. 11, 1906.

Fig. 1.

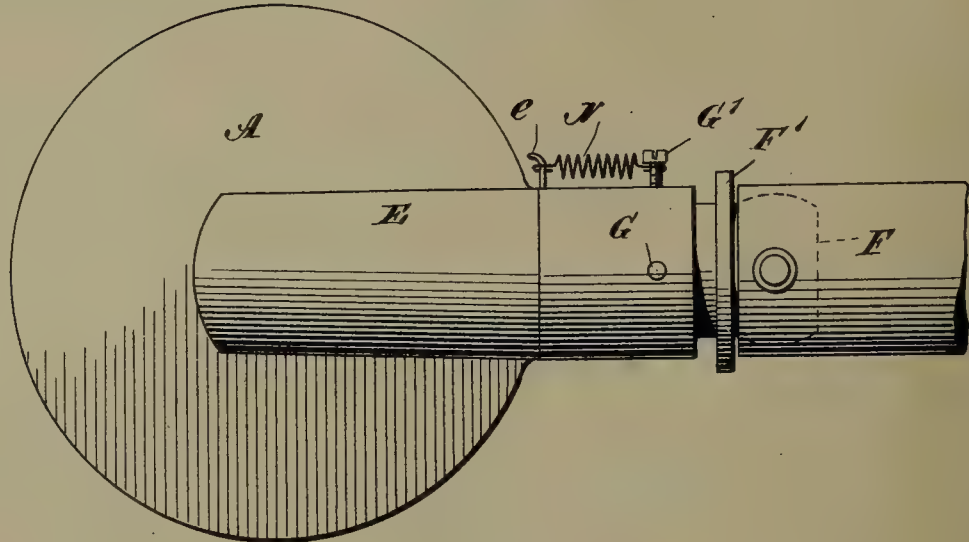


Fig. 2.

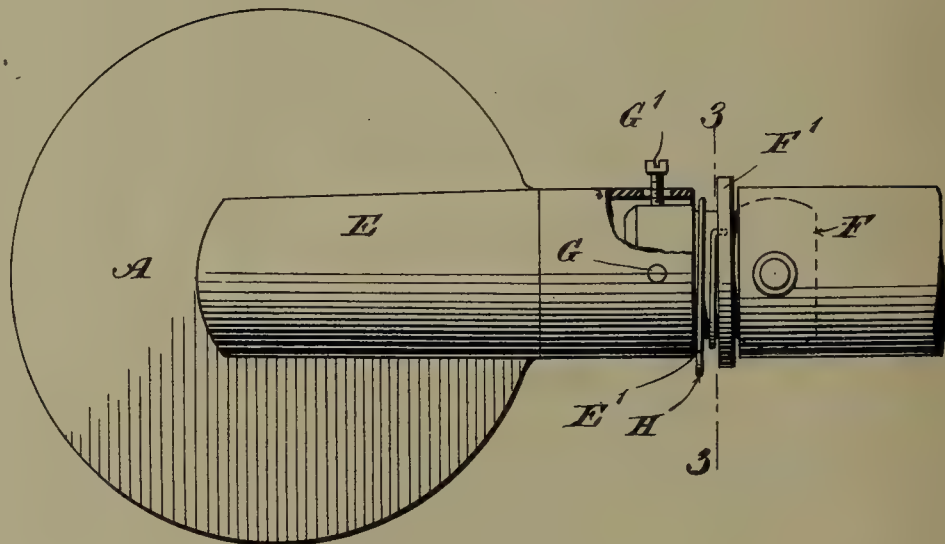
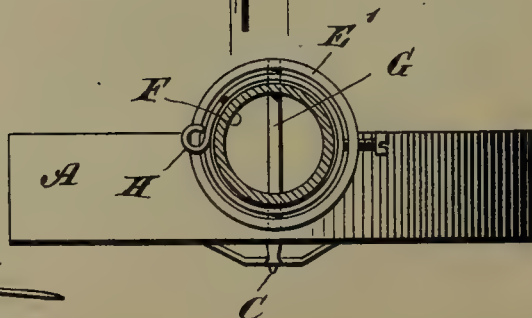


Fig. 3.



WITNESSES

Julius Schubert.
John A. Kehlener.

INVENTOR

William Schubert
BY
Briesen Thum
ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM SCHUBERT, OF RAHWAY, NEW JERSEY, ASSIGNOR TO THE REGINA COMPANY,
OF RAHWAY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

REPRODUCER FOR PHONOGRAPHS.

No. 865,435.

Specification of Letters Patent.

Patented Sept. 10, 1907

Application filed September 11, 1906. Serial No. 334,160.

To all whom it may concern:

Be it known that I, WILLIAM SCHUBERT, a citizen of the United States, and a resident of Rahway, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Reproducers for Phonographs, of which the following is a specification.

My invention relates to reproducers for phonographs and has for its object to construct devices of this kind in such a manner that the needle or stylus of the reproducer will always travel along the center of the grooves of the record.

My invention will be fully described hereinafter and the features of novelty will be pointed out in the appended claims.

Reference is to be had to the accompanying drawings, in which

Figure 1 is a plan view of a reproducer with my improvement applied thereto; Fig. 2 is a similar view of another form of my invention; and Fig. 3 is a cross section on line 3—3 of Fig. 2.

A is the body of the reproducer to which is secured the customary diaphragm B carrying the stylus C which travels in the grooves of the record D.

E is a tube connected with the body A and provided at its free end with the member F which is pivotally connected at G with said tube E. This member F is adapted to receive the customary tube for connection with the customary feeding arm which leads either to an amplifying horn or to other devices for conveying the sound to the hearer. A screw G' is connected with said member G and serves to limit its swinging movement.

So far I have described the reproducer as usually constructed. With devices of this kind as the reproducer is fed by the usual feed screw the tendency of the reproducer is to drag behind so that the needle or stylus engages one side of the grooves thus producing a grating noise. To overcome this difficulty I introduce the spring H (Figs. 2 and 3) one end of which engages a shoulder E' of the tube E and the other end of which abuts against a flange F' of the member F. This

spring is so arranged that it will have a tendency to press the reproducer in the direction in which said reproducer travels, thus overcoming the drag thereof and maintaining the stylus in the center of the grooves. The reproduction of the matter on the record is thus very clear and free from foreign noises or gratings.

In the form of my invention shown in Fig. 1 I have used a coil spring N one end of which is secured to a hook e on the member E and the other end of which is fastened to the screw G'. This spring is located on the outside of the reproducer and acts in the same way as the spring H.

Various modifications may be made without departing from the nature of my invention as defined in the claims.

I claim:

1. A reproducer comprising a plurality of connected sections, one of which carries the stylus and the other of which is adapted for connection with the feed mechanism, and means for normally flexing the connection between the stylus-carrying section relatively to the other section so that the stylus-carrying section is normally pressed in the direction of its reproducing movement independently of the other section.

2. A reproducer comprising a plurality of connected sections, one of which carries the stylus and the other of which is adapted for connection with the feed mechanism, and a spring for normally flexing the connection between the stylus-carrying section relatively to the other section so that the stylus-carrying section is normally pressed in the direction of its reproducing movement independently of the other section.

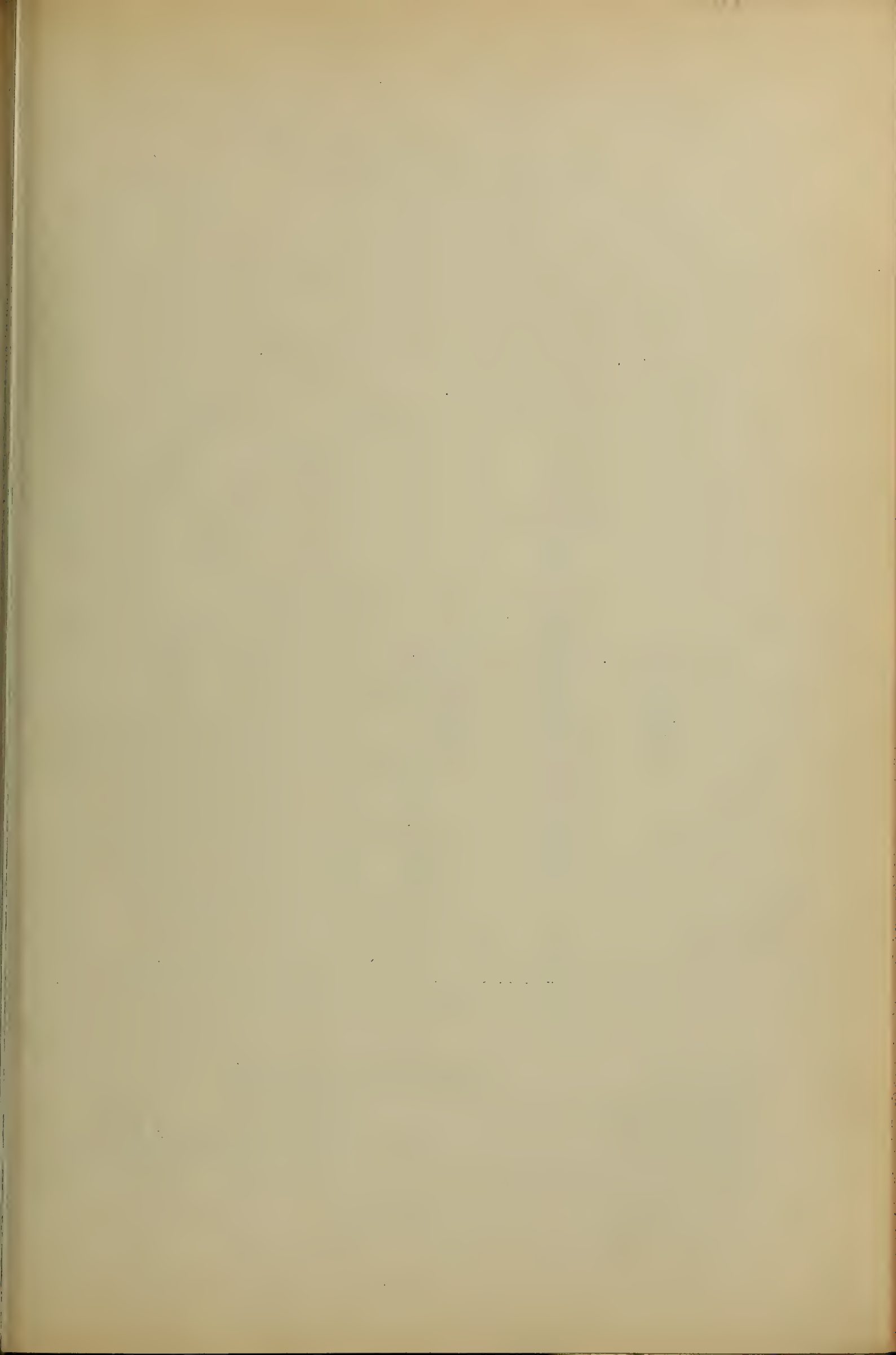
3. A reproducer comprising a plurality of sections one of which carries the stylus and the other of which is adapted for connection with the feed mechanism and which is pivotally connected with the stylus-carrying section about an axis transverse to the path in which the reproducer travels, and means for flexing the connection between the sections relatively to each other so that the stylus-carrying section is normally pressed in the direction of its reproducing movement independently of the other section.

In testimony whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

WILLIAM SCHUBERT.

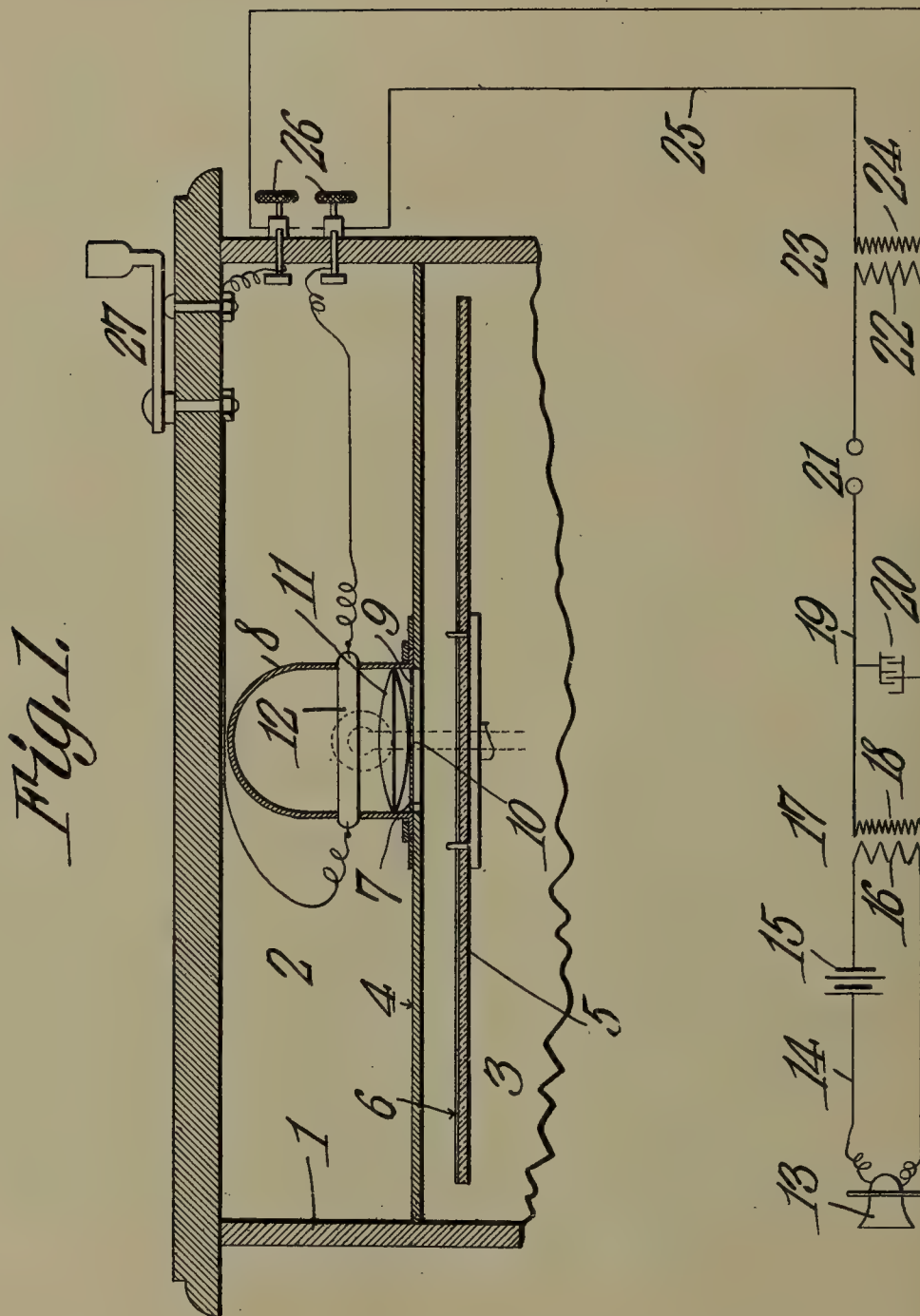
Witnesses:

WM. J. FROST,
J. B. FURBER.



J. F. DIRZUWEIT.
RECORDING AND REPRODUCING SOUNDS.
APPLICATION FILED APR. 29, 1907.

3 SHEETS—SHEET 1.

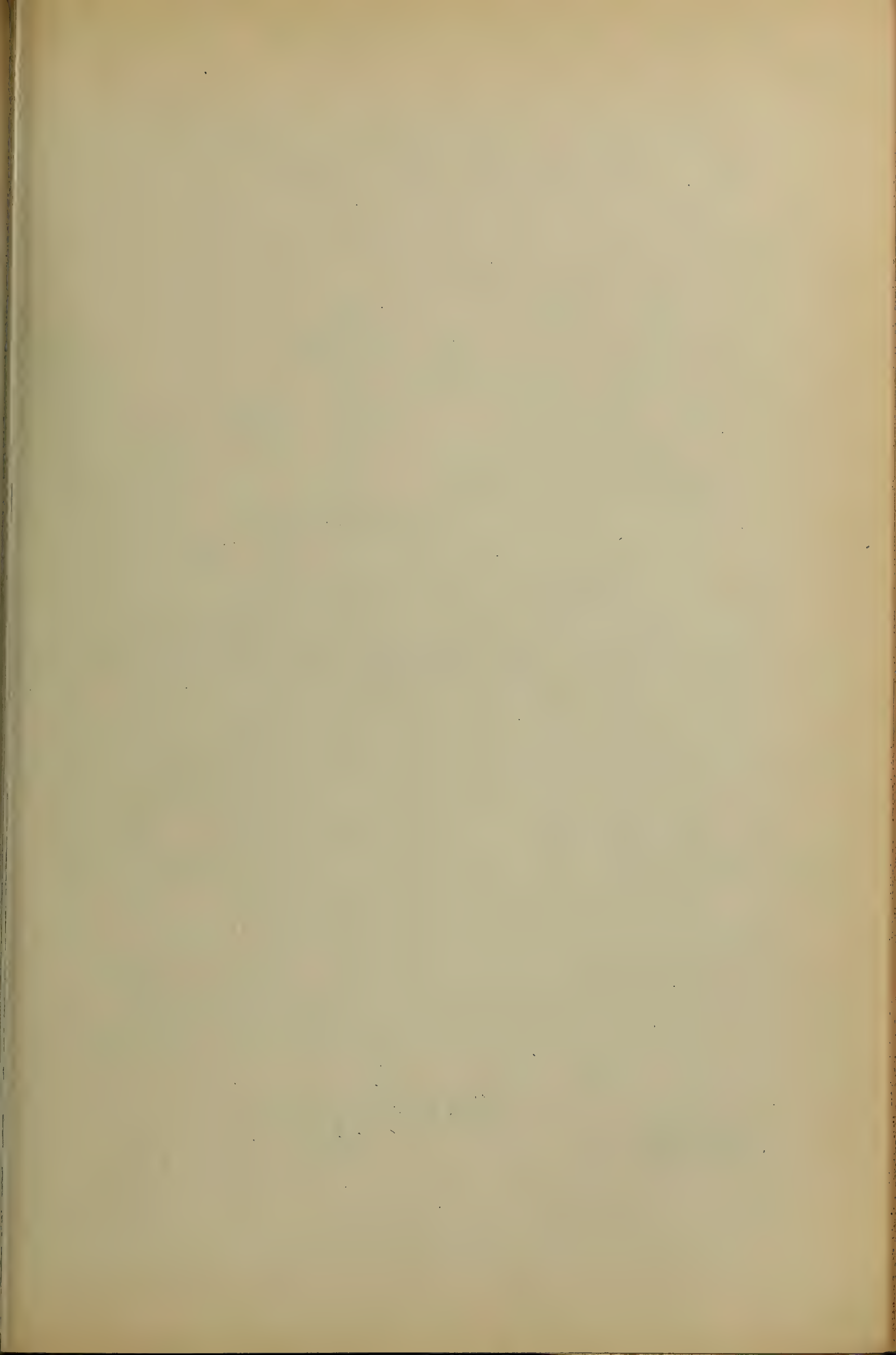


WITNESSES:

E. J. Chapman
F. J. Chapman

John F. Dirzuweit, INVENTOR.

By *C. A. Snow & Co.*
ATTORNEYS



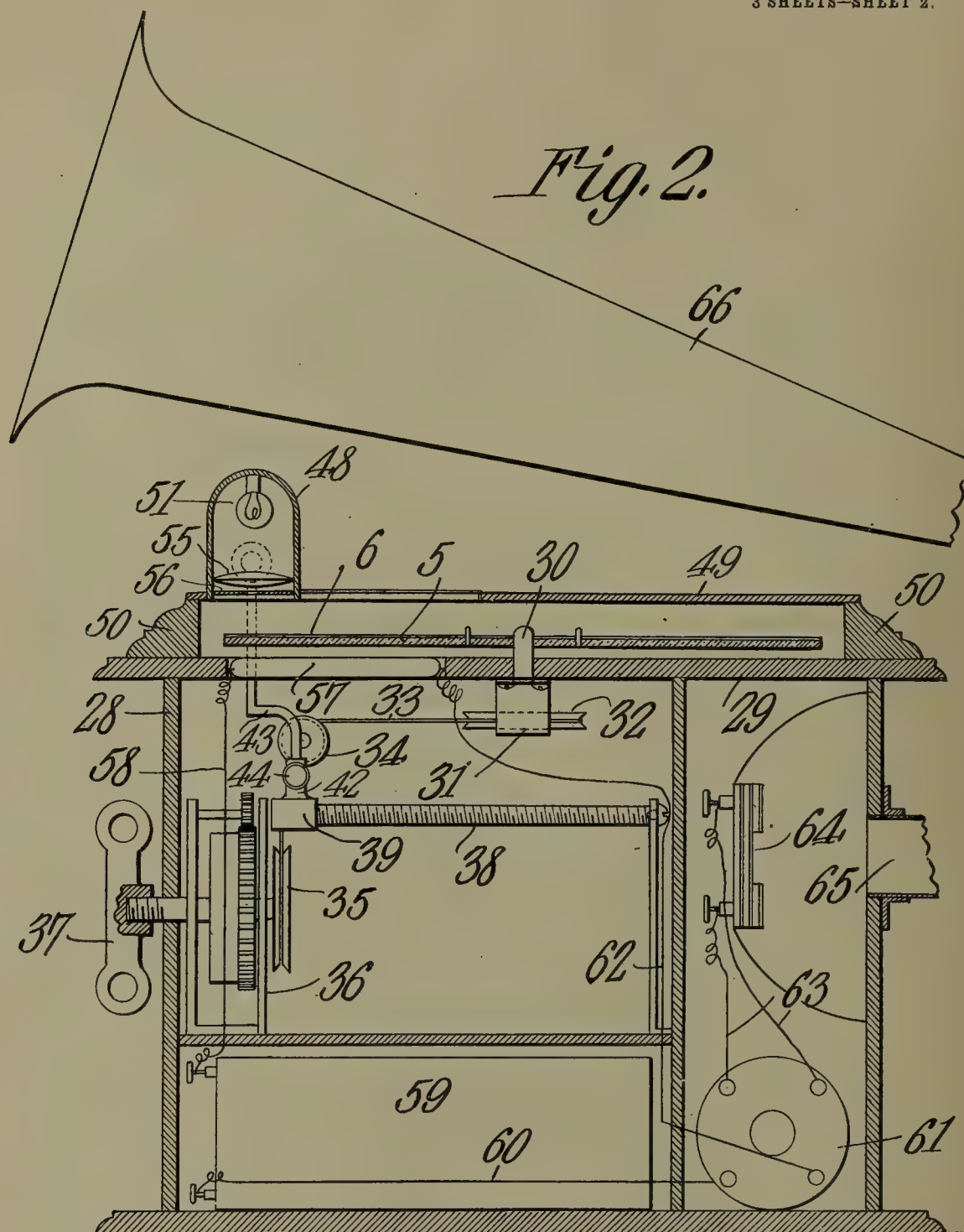
No. 865,574.

PATENTED SEPT. 10, 1907.

J. F. DIRZUWEIT.
RECORDING AND REPRODUCING SOUNDS.

APPLICATION FILED APR. 29, 1907.

3 SHEETS—SHEET 2.



WITNESSES:

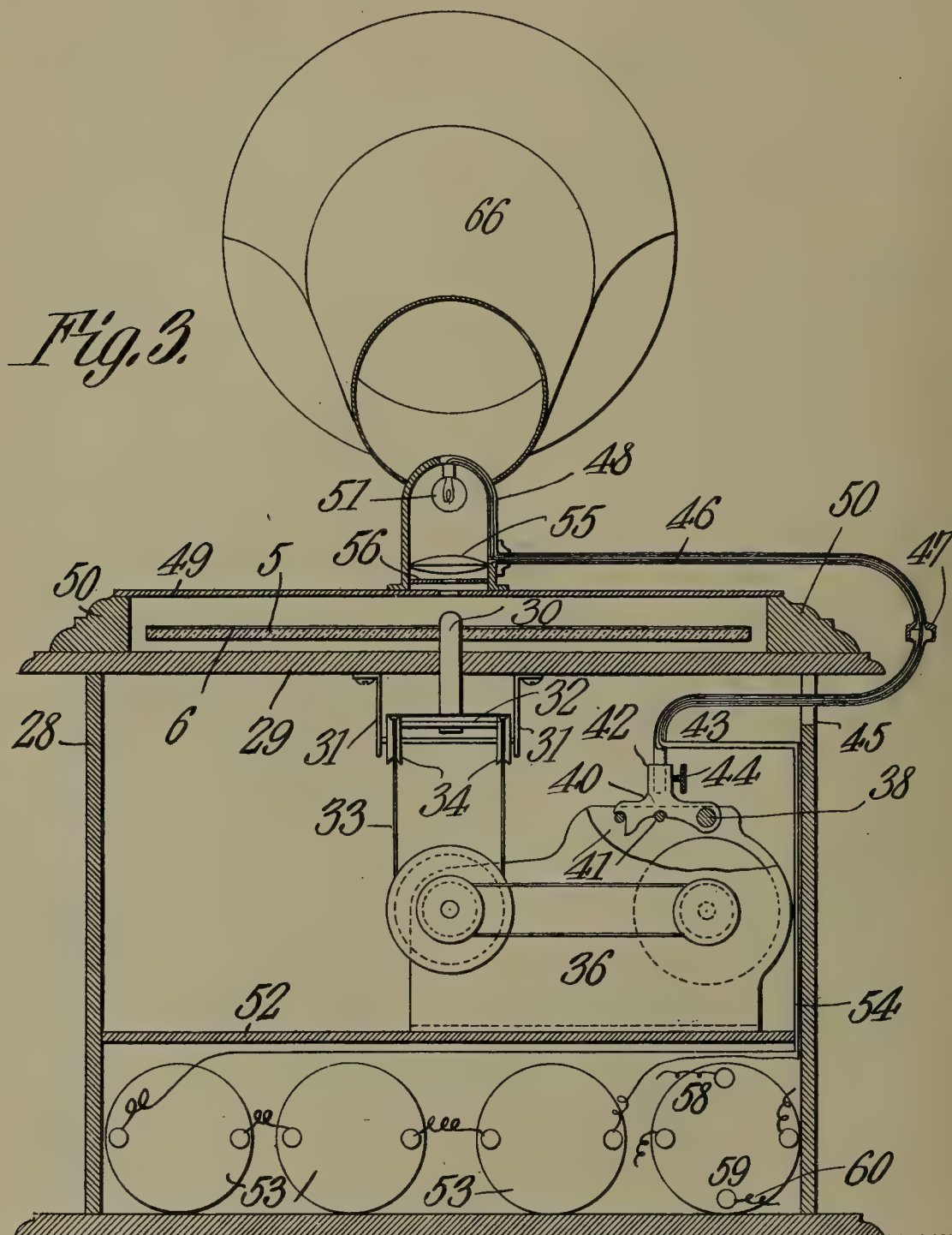
E. J. Stewart
F. T. Chapman

John F. Dirzuweit, INVENTOR.

By *C. A. Snow & Co.*
ATTORNEYS

J. F. DIRZUWEIT.
RECORDING AND REPRODUCING SOUNDS.
APPLICATION FILED APR. 29, 1907.

3 SHEETS—SHEET 3.



WITNESSES:

E. J. [Signature]
F. T. Chapman

John F. Dirzuweit,

INVENTOR.

By *CA Snow & Co.*
ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHN F. DIRZUWEIT, OF PHILADELPHIA, PENNSYLVANIA.

RECORDING AND REPRODUCING SOUNDS.

No. 865,574.

Specification of Letters Patent.

Patented Sept. 10, 1907.

Application filed April 29, 1907. Serial No. 370,898.

To all whom it may concern:

Be it known that I, JOHN F. DIRZUWEIT, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Recording and Reproducing Sounds, of which the following is a specification.

This invention has reference to improvements in recording and reproducing vocal and other sounds.

The object of the invention is to produce a photographic record of sounds by electro-actinic means and to reproduce the recorded sounds by luminous rays varied in intensity in accordance with a photographic record of the sounds and producing by these variations in luminosity electric vibrations which, in turn, set up air vibrations corresponding to the recorded sounds.

The recording of the sounds is performed photographically by first setting up electric vibrations in a suitable charged circuit and then transforming these electric vibrations into light vibrations, the intensity of which are varied in accordance with the original sounds. These variable light vibrations are transmitted to a movable sensitive film in such manner as to impinge thereon so as to produce, when the film is properly developed, a line the light transmitting properties of which vary in proportion to the variations of the original sound waves. Structurally considered, this portion of the invention comprises a sensitive microphonic transmitter suited to strong currents. Included in the microphonic circuit is the coarse wire winding of a suitable transformer and the secondary circuit of this transformer is included in a circuit across which is branched a condenser and in which is included a spark gap and the primary coil of a high tension transformer. The secondary coil of the high tension transformer is closed through a Tesla tube which, when active, radiates highly actinic rays. These rays are gathered by a suitable lens and projected as a bundle of small area upon a photo-sensitive film otherwise protected against actinic light. With such a structure electric vibrations are set up by the sounds uttered against or otherwise reaching the microphonic transmitter and these electric vibrations are ultimately transformed into light radiations from the Tesla tube, which light radiations vary in accordance with the sound waves impinging against the microphone. Consequently, the photo-sensitive film is affected by the light in direct proportion to the intensity thereof and when the film, after being subjected to the light, is developed there appears thereon a light-obstructing line varying in light-obstructing properties in accordance with the original sounds acting on the microphone.

The invention comprises in conjunction with the recording of sounds, as set forth the reproduction of

sounds from such a photographic record, and this reproduction is made by passing a light-beam through the photographic record and thereby obstructing the light-beam to an extent depending upon the density of said record and its light-obstructing properties. This light-beam of varying intensity is caused to act upon a suitable selenium cell which, in turn, controls a charged electric circuit including a telephonic receiver. This latter is located in a suitable resonator or sound-amplifier by which the sound waves produced by the receiving diaphragm are amplified to a sufficient extent to become distinctly audible to a considerable distance.

The invention therefore consists, first, in the recording of sounds photographically by the varying intensity of a source of light in accordance with sound waves, and then in reproducing such record by varying the light coming from a constant source of light by the interposition of the record in the beam of light, and converting the light variations into sounds through the intermediary of an electric circuit the resistance of which is varied by the variable light-beam all as set forth in the claims.

The invention will be fully understood from the following detailed description taken in connection with the accompanying drawings forming part of this specification, in which,—

Figure 1 is a longitudinal section of so much of a recording machine constructed in accordance with my invention as is necessary for the understanding thereof, with electric circuits coacting therewith shown diagrammatically; Fig. 2 is a central section, with parts in elevation, taken through a reproducing machine constructed in accordance with my invention; and Fig. 3 is a section through the structure of Fig. 2, at right angles to the section shown in Fig. 2 and also having parts shown in elevation.

Referring to the drawings, and more particularly to Fig. 1, there is shown a suitable casing 1 having an upper compartment 2 and a lower compartment 3 divided by a horizontal partition 4. In the lower compartment there is suitably mounted a rotatable table or tablet-carrier 5 upon the surface of which there is secured a photo-sensitive film 6. In the particular instance shown in the drawing this photographic film 6 is in the form of a disk and the carrier 5 is also a disk, and preferably the carrier disk is made of glass, though it is possible to make it of some other transparent material. Obviously, the photographic film may be made in the form of a long web mounted upon suitable carriers instead of being in the form of a disk, but as the production of a photographic record of sounds upon a disk or upon a strip, in itself, forms no part of the present invention, it is not deemed necessary to show the strip in the drawings

It will, of course, be understood that the sensitive film 6 is protected within the compartment 3 against the action of actinic light except as hereinafter described. The partition 4 is provided with an opening 7 radially disposed with relation to the disk 5, and covering this opening is a box or shell 8 arranged to slide along the opening 7 in a radial path with relation to the disk 5 by means which will be hereinafter described with reference to Figs. 2 and 3. The lower end of the box 8 is closed by a diaphragm 9 having a small central perforation 10, shown greatly exaggerated in the figure. Within the box 8, above the diaphragm, is a suitable lens 11 and above the lens 11 is a Tesla tube 12.

Suitably located with reference to the parts just described is a microphonic transmitter 13 which should possess great sensitiveness and be adapted to heavy currents. This microphonic transmitter 13 is included in the usual circuit 14 which also includes a battery 15 and the coarse wire coil 16 of a transformer 17. These parts may all be of the usual type used in telephonic transmission and need no particular description. The secondary coil 18 of the transformer 17 is included in another circuit 19, which circuit is bridged by a condenser 20 of suitable capacity. Beyond the condenser the circuit 19 includes a spark gap 21 and the primary coil 22 of a high-tension transformer 23. The secondary coil 24 of the transformer 23 is included in a circuit 25, the terminals of which are connected to the terminals of the Tesla tube 12, and for convenience the circuit 25 may include binding posts 26 fast on the casing 1 and a suitable switch 27, also carried by the casing 1. By this latter means the tube 12 may be thrown into and out of action at will and the binding posts 26 permit the location of the major portion of the circuits exterior to the casing 1.

Now, let it be assumed that the switch 27 is closed and that the table 5 with the film 6 is being steadily rotated by any suitable source of power such as a spring motor, and that the box 8 is being fed radially across the film 6 from the outer edge thereof toward the center. Under these conditions let it be supposed that sounds are uttered or otherwise produced in front of the microphone 13. Variations of current corresponding to the sound vibrations are immediately set up in the microphone circuit. These variations of current are, as is well understood, transformed into alternating currents in the circuit 19 which includes the secondary circuit 18 of the microphonic transformer 17. The alternate charging and discharging of the condenser 20 produces currents which pass the spark gap and thus set up in this condenser circuit electrical oscillations of great rapidity. This causes in the circuit 25 electrical oscillations of very high tension and great rapidity which are manifest in the tube 12 in the form of light, and this particular form of light has great actinic power. The rays emanating from the tube 12 are gathered by the lens 11 and transmitted to the diaphragm 10 in the form of a minute bundle of great intensity where it impinges upon the film 6. No attempt has been made in the drawing to show the proper distances of the tube, lens, diaphragm and film, but it will be understood that in practice these parts are all properly proportioned for the purpose. Now, the actinic rays emanating from the tube 12 are not of constant power but vary in ac-

cordance with the sounds acting on the microphone 13, and, therefore, these rays act upon the film 6 in proportion to their intensity. The result is that when the film 6 is developed the resultant line which, as will be understood, is in the form of a spiral upon said film, is made of deposited silver varying in density in accordance with the actinic strength of the light which has reached it. It may be noted that in accordance with this invention the initial light source is varied in accordance with the original sound waves.

When the sensitive film has been properly exposed to the light it is removed from the casing 1 under the proper non-actinic light conditions and either removed from the support 5, if the latter be opaque, or the support and film both are removed from the machine if the support be of glass or other transparent material, and the photographic record of the sounds is developed in the usual manner. The record as produced is in the form of a spiral light-obstructing line upon a transparent base or in a transparent film, the light-obstructing powers of said line varying in accordance with the intensity of the light emanations from the tube 12, which light emanations vary in accordance with the variations of the original sound waves. To reproduce such a sound record I have devised the structure shown in Figs. 2 and 3, to which reference will now be had. In these figures there is shown a casing 28 similar to the casing 1 of the structure shown in Fig. 1 with, however, certain modifications of the interior which will appear further on. Extending upward through the top 29 of the casing there is an upright shaft 30 mounted at its lower end in suitable bearings 31 fast on the under side of the top 29 of the casing, and this shaft carries a pulley 32. The upper end of the shaft 30 is constrained to receive and retain a transparent, disk-shaped table or support 5 having thereon a developed photographic film upon which a sound record has been produced in the manner already described. The shaft 30, and sound record thereon, is rotated by means of a cord or strap 33 passing over pulleys 34 suitably mounted within the casing and thence to a drive pulley 35 under the control of a suitable spring motor 36, properly mounted and secured within the casing 28. The spring of this motor is put under tension by means of a winding-key 37 exterior to the casing 28. The motor 36, by suitable gearing, gives rotative movement to a feed-screw 38 upon which there is mounted a nut 39 which, as is usual in phonographs or similar machines, may be of the half-nut type. This nut 39 forms part of a carriage 40 which may be guided upon rods 41. The upper end of the carriage is provided with a socket 42 to receive the end of a bracket 43 held to the carriage by a suitable thumb-nut or set-screw 44. This bracket 43 extends upward from the socket 42 and then is bent horizontally and passed through a slot 45 in one side of the casing 28 below the top 29 thereof and then this bracket, outside of the casing, is bent upwardly, as shown. To the upper end of the bracket 43 there is secured an arm 46 by means of a suitable coupling 47. This arm 46 is suitably bent so as to first rise from the coupling 47 and then extend horizontally across the top of the machine, and is connected at its other end, remote from the coupling 47, to a shell 48, shown as bell-shaped but which may be otherwise shaped if so desired. The base of this shell rests upon a platform 49 elevated by suitable end and

side supports 50 to a suitable distance above the top 29 of the casing to form a chamber in which is inclosed the sound record support 5 with its film surface 6. For convenience the support 5, which in this particular instance is of glass or other transparent medium, with the photographic film 6 thereon, will hereinafter be referred to simply as the sound record tablet.

Since, as will hereinafter appear, the sound record tablet should be protected from light except that which is transmitted to it in a manner to be described, the platform 49 may be of opaque material and be provided with a radial opening along which the shell 48 is made to travel in a straight line which is radial with reference to the sound record tablet 5 and which movement of the shell 48 is caused by the feeding of the bracket 43 and its arm 46 by the nut 39 and feed-screw 38, all as will be readily understood.

While not so shown in the drawings, it will be understood that a suitable sliding cover or protection will be provided to prevent the entrance of light through the slot in the platform 49 except where the shell 48 covers it.

Within the shell 48 there is located a light source 51 which may be, as shown, an incandescent electric lamp. In order to provide current for this lamp, there may be located in the bottom portion of the casing 28 under a partition 52 supporting the driving mechanism a number of cells 53 of battery which may for convenience be of the type known as dry batteries. Conductors 54 leading from the batteries may be carried to the bracket 43, and entering the same, be carried through said bracket, which may be made hollow for the purpose, and through the arm 46 and thereby ultimately reach the lamp 51. For the purposes of this portion of the invention the source of light should be constant, and for all practical purposes a lamp as described, fed from batteries in the manner set forth, will be sufficient.

The lamp 51 is located at the upper end of the opaque shell 48 and below this lamp there is located a suitable lens 55 with a perforated diaphragm 56 below the same and having its opening coincident with the slot through the platform 49. The parts are so proportioned that the light from the lamp is gathered by the lens and strikes through the tablet 5 and upon a selenium cell 57 secured in the top 29 of the casing 28. This cell 57 is sufficiently long and so located as to extend radially beneath the tablet for a distance sufficient to embrace the radial extent of the longest record which may be produced upon the record tablet. One terminal of this cell 57 is connected by a conductor 58 to one pole of a suitable battery 59, the other pole of which is connected by a conductor 60 to one terminal of the coarse wire coil of an inductorian 61. The other terminal of the coarse wire coil of the inductorian 61 is connected by a conductor 62 to the other end of the selenium cell 57. The fine wire coil of the inductorian 61 is connected by conductors 63 to the coil of a telephonic receiver 64, which may be of any suitable type and is simply indicated in the drawings. This telephonic receiver 64 is located opposite the small end 65 of an amplifying horn 66, which may be suitably supported upon the casing but which mounting is not shown in the drawings for want of room.

With a structure such as has been described with ref-

erence to Figs. 2 and 3, the operation of reproducing a sound record made by the apparatus set forth with reference to Fig. 1 is as follows: The motor is set in operation after the tablet 5 has been placed in position, which latter act may be performed by making the portion of the structure covering the tablet removable. By coupling the battery 53 to the lamp 51 by a suitable switch, not shown, or otherwise, the lamp is made to glow steadily. A light beam is directed by the lens 55 through the tablet 5 and on to the selenium cell 57. Now, as is well known, the resistance of selenium is varied by the effect of light directed against it. By causing the light-beam to be intercepted by the photographic record upon the tablet 5, the amount of light reaching the selenium cell is varied in direct proportion to the density of the photographic sound record in the film 6 of the tablet 5. Consequently, the current flowing through the coarse wire coil of the inductorian 61 is varied in accordance with the variations in the light-beam transmitted through the record tablet 5. The result is that the telephonic receiver 64 is likewise affected by the varying impulses reaching it and the diaphragm of this receiver imparts to the surrounding air vibrations in accordance and commensurate with the rate and amplitude of vibration of the diaphragm of the telephonic receiver. Since these vibrations are in accordance with the sounds originally produced in front of the microphonic transmitter 13, there are, therefore, sounds produced by the action of the receiver diaphragm upon the air and these sounds pass through the amplifying horn 66 and are emitted therefrom in intensified form clearly audible for a distance from the amplifier 66 corresponding to the loudness of the produced sounds.

I claim:—

1. The method of recording and reproducing sounds consisting in forming a photographic record of the sounds by directing actinic rays emanating from a source thereof upon a photo-sensitive surface, and varying the amount of said emanations by and in accordance with the sound waves, then developing the photo-sensitive surface, then interposing the sound record so produced in the path of a constant beam of light, setting up in an electric circuit electric variations by and in accordance with the variations of the transmitted light-beam, and producing by said electric variations air vibrations corresponding to the original sounds.

2. The method of recording and reproducing sounds consisting in setting up in an electric circuit electric variations corresponding to the initial sound waves, producing thereby corresponding actinic radiations, subjecting a photo-sensitive surface to said actinic radiations, then developing said photo-sensitive surface to produce a sound record, then producing variations in a beam of light of constant intensity by passing the same through said sound record, then setting up in an electric circuit electric variations by and in accordance with the variations in intensity of the transmitted beam of light, and producing by said including the aforesaid source of actinic rays and in inductive relation to the second circuit.

3. The method of recording sounds consisting in forming a photographic record of the sounds by directing actinic rays emanating from a source thereof upon a photo-sensitive surface and varying the amount of said emanations by and in accordance with the sound waves.

4. The method of recording sounds consisting in setting up in a charged electric circuit variations corresponding to the sound waves, producing actinic radiations by and in accordance with said electric variations, and directing said actinic radiations upon a photo-sensitive surface.

5. The method of recording sounds consisting in pro-

ducing in a charged electric circuit current variations corresponding to the sound waves, producing by said current variations groups of electric pulsations corresponding in frequency and duration to the original sound waves, producing by said groups of electric pulsations actinic rays varying in duration and intensity in accordance with the original sound waves, and subjecting a photo-sensitive surface to said actinic rays.

6. A sound recording apparatus comprising a carrier for a photo-sensitive surface, a source of actinic rays in operative relation to said photo-sensitive surface, an electric circuit including said source of rays, means for charging said circuit, and means for producing variations of the electric current in said circuit by and in accordance with sound waves.

7. A sound recording apparatus comprising a carrier for a photo-sensitive surface, a source of actinic rays in operative relation to said photo-sensitive surface, a charged electric circuit, a microphonic transmitter included therein, another electric circuit in inductive relation to the first-named circuit and including a spark gap, a condenser

bridged across the second circuit, and a tertiary circuit including the aforesaid source of actinic rays and in inductive relation to the sound circuit.

8. A sound recording apparatus comprising a photo-sensitive surface and a source of actinic rays movable relative one to the other, and means for exciting said source of actinic rays by and in accordance with sound waves.

9. A recording apparatus comprising a suitable carrier for a photo-sensitive surface, a Tesla tube movable with relation to the photo-sensitive surface, means connected with said Tesla tube for producing actinic emanations therefrom by and in accordance with sound waves, and means for directing said emanations progressively along said photo-sensitive surface.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOHN F. DIRZUWEIT.

Witnesses:

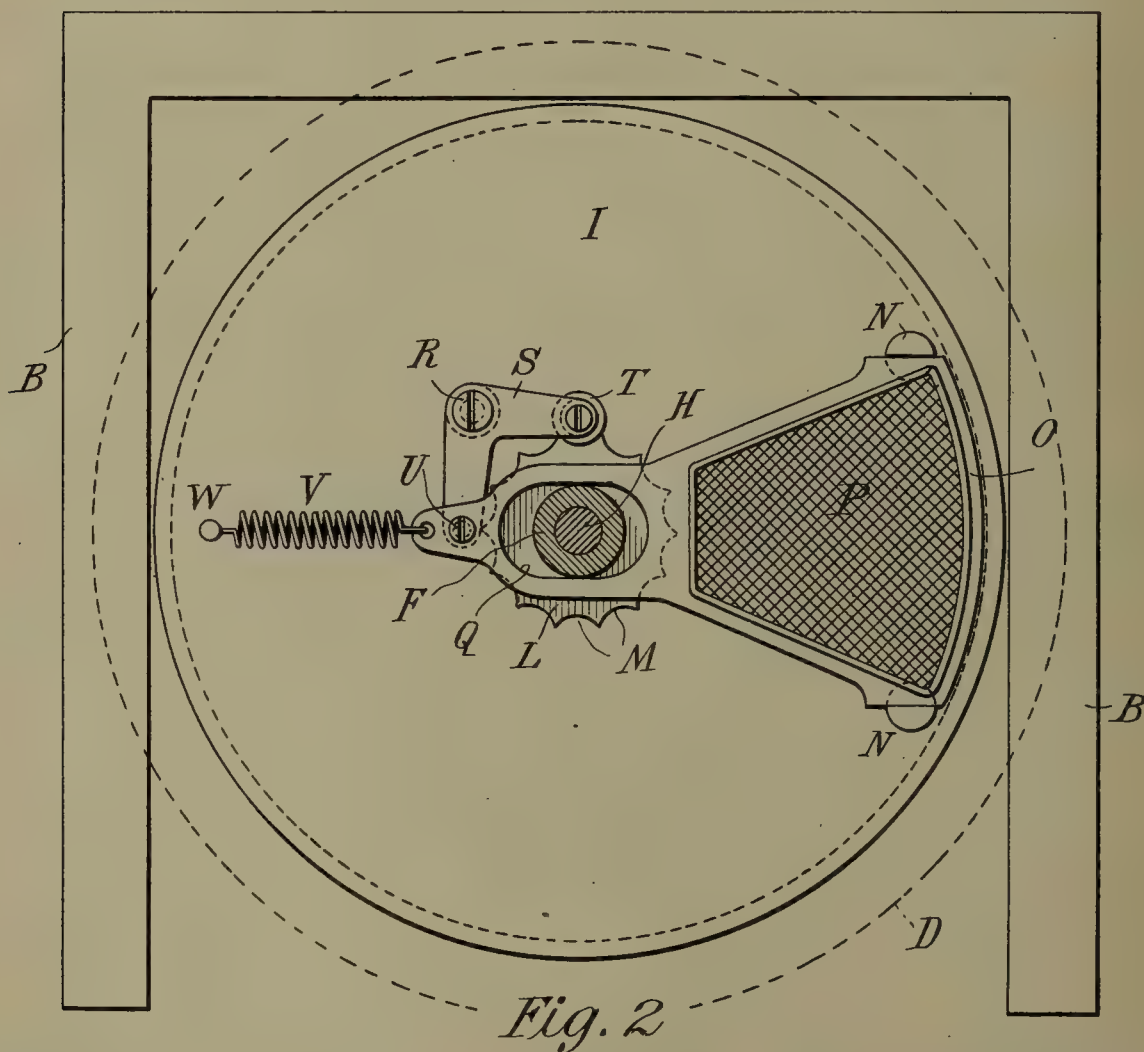
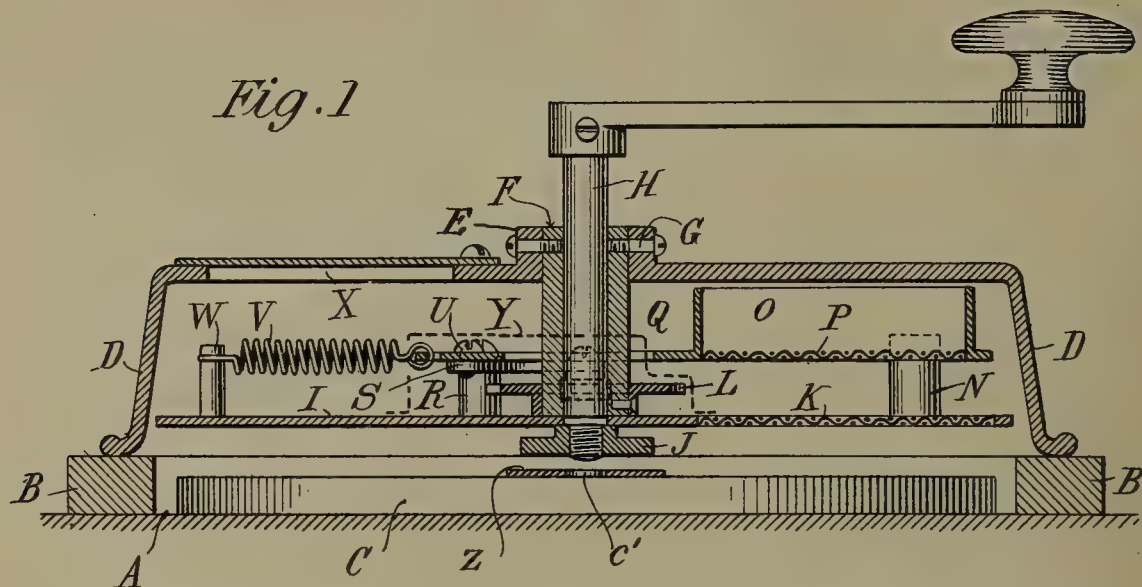
FRED. P. LIESEE,
OSIAS DRESNEY.

No. 865,716.

PATENTED SEPT. 10, 1907.

T. H. MACDONALD & F. L. CAPPS.
SIEVE FOR USE IN MAKING DISK SOUND RECORDS.

APPLICATION FILED JAN. 7, 1907.



Witnesses
Gustave R. Thompson.
Ruth C. Fitzhugh

Thomas H. Macdonald, Inventors
Frank L. Capps
By their Attorneys
Mauro, Cameron, Lewis & Massie

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD AND FRANK L. CAPPS, OF BRIDGEPORT, CONNECTICUT, ASSIGNORS
TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

SIEVE FOR USE IN MAKING DISK SOUND-RECORDS.

No. 865,716.

Specification of Letters Patent.

Patented Sept. 10, 1907.

Application filed January 7, 1907. Serial No. 351,230.

To all whom it may concern:

Be it known that THOMAS H. MACDONALD and FRANK L. CAPPS, citizens of the United States of America, and residents of Bridgeport, Fairfield county, Connecticut, have invented a new and useful Improvement in Sieves for Use in Making Disk Sound-Records, which improvement is fully set forth in the following specification.

Our invention relates to the production of disk sound-records, particularly records made in accordance with the Hoyt and Gavin patents of Jan. 2, 1906, No. 808,842, No. 808,843, and No. 809,263. According to these patents, the body or main portion of the disk which carries the sound-record is composed of a comparatively cheap material, while the surface thereof containing the impressions or other irregularities corresponding to the sound-waves is composed of a more expensive material which is peculiarly adapted to the purpose. The former material (or equivalents therefor) will hereinafter be designated as "ordinary stock" or simply "stock", while the more expensive material intended for the surface of the record will be designated as "glaze". It is desirable, of course, to use as little of the glaze as possible, and at the same time to insure the presence of a sufficient amount; and it is also desirable that this glaze be uniformly distributed throughout the surface of the record.

The present invention consists of a machine or apparatus for insuring these two purposes, viz.: The employment of just the right amount of glaze, no more and no less, and the uniform distribution of the glaze.

The invention will be best understood by reference to the accompanying drawings in which

Figure 1 is a vertical section through our apparatus; and Fig. 2 is a plan view of the same with the stationary casing removed.

Upon a table or flat surface A are located two supports B upon which rests our apparatus, so that the matrix C may be inserted beneath the apparatus.

D represents a metal casing, which may be described as an inverted pan having a central orifice surrounded by an upturned flange E.

F is a stationary spacing-sleeve secured firmly in the central opening, as by screws G that pass through flange E.

H is a shaft having a crank-arm at the top, and journaled in the sleeve F. Below the sleeve F, the shaft H is flattened so as to fit into a corresponding central aperture in the plate or disk I; while the extreme end of shaft H is screw-threaded. The disk I bears against the lower face of sleeve F, and is clamped in place by the nut J that is screwed on the end of shaft H. When

shaft H is revolved by means of its crank handle, the disk I is caused to revolve.

A portion of the disk I (preferably a radial segment thereof) is cut away, and a grating or wire mesh K secured in its place. This will be called the lower grating. Fast near the lower end of sleeve F is a star wheel L having concave seats M. On each side of the grating K a shouldered stud N rises from near the circumference of disk I, so as to furnish bearings for the reciprocating sieve O, whose inner end is supported in a manner that will presently be described.

The sieve O is preferably of the same shape as the cut-away portion of disk I, is located above it, and is provided with a grating or mesh P that will be referred to as the upper grating. The bottom of sieve O is extended past the center of disk I, and contains a slot Q so as to furnish clearance for the sleeve F.

R is a stud rising from the disk I, upon which is pivoted the elbow lever S. Depending from one member of lever S is carried a roller T adapted to engage the seats M of star-wheel L; while the other member of the lever is pivotally connected at U to the extension of sieve O. A spring V, whose outer end is secured to a stud W on the disk I, serves to draw the sieve O radially inward; while each tooth of star-wheel L (by moving roller T radially outward) serves to force sieve O radially outward. Consequently, rotation of disk I, by means of the crank handle, produces not only a revolution of the sieve O upon the axis H, but also gives it a reciprocating movement, radially inward and outward.

A covered aperture X will be provided in the stationary casing D, conforming in size and shape to the sieve O, by which the latter may be filled for each operation. A shield or cover Y for the operating parts L—S—T—, etc., may likewise be provided, so as to protect them from the powdered composition which the apparatus is to distribute.

The operation of our apparatus is obvious. A matrix C (which may be heated beforehand) is inserted face upwards in the space between the supports B, just beneath our apparatus. A steel disk Z is placed over the center of the matrix, being centered thereon by the stud *c'* thereof which enters a central aperture in disk Z. The purpose of this is to prevent any of the glaze from being deposited upon the center of the matrix, where no record-lines are to be produced. The sieve O is brought underneath the aperture X, and filled with the proper amount of powdered glaze. The factory manager or expert will have determined how much glaze is to be used for a record of a given size, and the sieve O is loaded accordingly. The

crank of shaft H is then revolved, whereupon the sieve O is caused to reciprocate and discharge its contents in a fairly uniform manner, while at the same time the sieve and the lower grating are carried
5 around the entire circle. On account of the two gratings, the distribution of the powdered glaze over the surface of the matrix C is for all practical purposes absolutely uniform. The heat of the matrix causes the powdered glaze to adhere somewhat to its
10 surface. Thereafter, though the subsequent steps form no part of our present invention, the steel disk Z may be removed, and a lump of ordinary stock placed upon the matrix C (though the deposit of glaze will remain interposed between the ordinary stock and
15 the matrix C) and pressure applied in the usual manner, which will spread out the ordinary stock and at the same time compress it against the glazing already deposited and produce the finished record.

Of course, instead of taking ordinary stock, an old
20 disk record may be warmed up and placed upon the matrix and re-pressed, with the same results; or a disk of some other material (cardboard, celluloid, etc.) may be employed, the heat and pressure serving to bind it firmly to the glazing already deposited by our
25 apparatus, and simultaneously produce a finished sound-record. Moreover, instead of placing a matrix C beneath the apparatus, we may use an old record (or a disk of any other suitable material), deposit the glazing thereon by our apparatus, and then place a
30 matrix face downwards on the glazing and subject to heat and pressure in the usual manner.

While we have described our invention with some particularity, we have done so only for the sake of clearness, since changes may be made in the construction and arrangement of parts, and certain features of our invention used to the exclusion of others. The spirit of our invention consists in causing the powdered glaze to be uniformly distributed over the surface to be treated by means of a jogging or shaking
35 motion which progresses over the entire surface; and preferably we employ two gratings; if, for instance, the lower grating should be omitted, we have found that the glazing is liable to be deposited in a series of "windrows", as it were. Nevertheless, if the lower
40 grating be omitted, or if (instead of the sieve with its upper grating) a hopper with a slit or restricted aperture at its bottom be employed, in either case the apparatus will be within the spirit of our invention.

Having thus described our invention, we claim:

50 1. The combination of a lower grating adapted to travel in a circular path, an upper grating located above the same

and adapted both to travel in the same path and also to reciprocate radially of said path.

2. The combination of a lower grating adapted to travel in a circular path, an upper grating located above the same and adapted both to travel in the same path and also to reciprocate radially of said path, and common means for actuating both gratings. 55

3. The combination of a lower grating adapted to travel in a circular path, an upper grating located above the same and adapted both to travel in the same path and also to reciprocate radially of said path, and common means comprising a stationary star-wheel and a lever co-acting therewith and connected to said upper grating for actuating both gratings. 60 65

4. The combination of a stationary sleeve, one or more projections carried thereby, a revoluble shaft journaled in said sleeve, a plate secured to said shaft and carrying a grating, a reciprocating sieve mounted on said plate above said grating, and means co-acting with said projections for reciprocating said sieve. 70

5. The combination of a stationary sleeve, a star-wheel carried thereby, a revoluble shaft journaled in said sleeve, a plate secured to said shaft and having a grating, a reciprocating sieve mounted on said plate above said grating, an elbow-lever on said plate connected to said sieve at one end and at its other end carrying a device that co-acts with said star-wheel whereby the sieve is forced outward, and means for drawing said sieve inward. 75

6. The combination with a stationary casing and a vertical sleeve made fast in the center thereof, a revoluble shaft journaled in said sleeve and carrying a plate provided with a grating, a reciprocating sieve mounted on said plate above said grating, and means actuated by said shaft for reciprocating said sieve. 80 85

7. The combination of a stationary casing having an open bottom and supporting a stationary sleeve in its center, a revoluble shaft journaled in said sleeve and carrying a plate provided with a grating, a reciprocating hopper mounted upon said plate above said grating, an elbow-lever pivoted upon said plate and having one end secured to the extension of said sieve and carrying on its other end a roller, a star-wheel fast on said sleeve and adapted to actuate said roller, and a spring attached to said sieve and acting in opposition to said star-wheel. 90 95

8. In a device of the character described, a sieve, means for carrying said sieve in a circular path, and means for reciprocating said sieve radially of said path.

9. The combination of a plate having a cut-away portion, reciprocating sieve carried by said plate above said cut-away portion, and common means for rotating said plate and sieve and for reciprocating the latter. 100

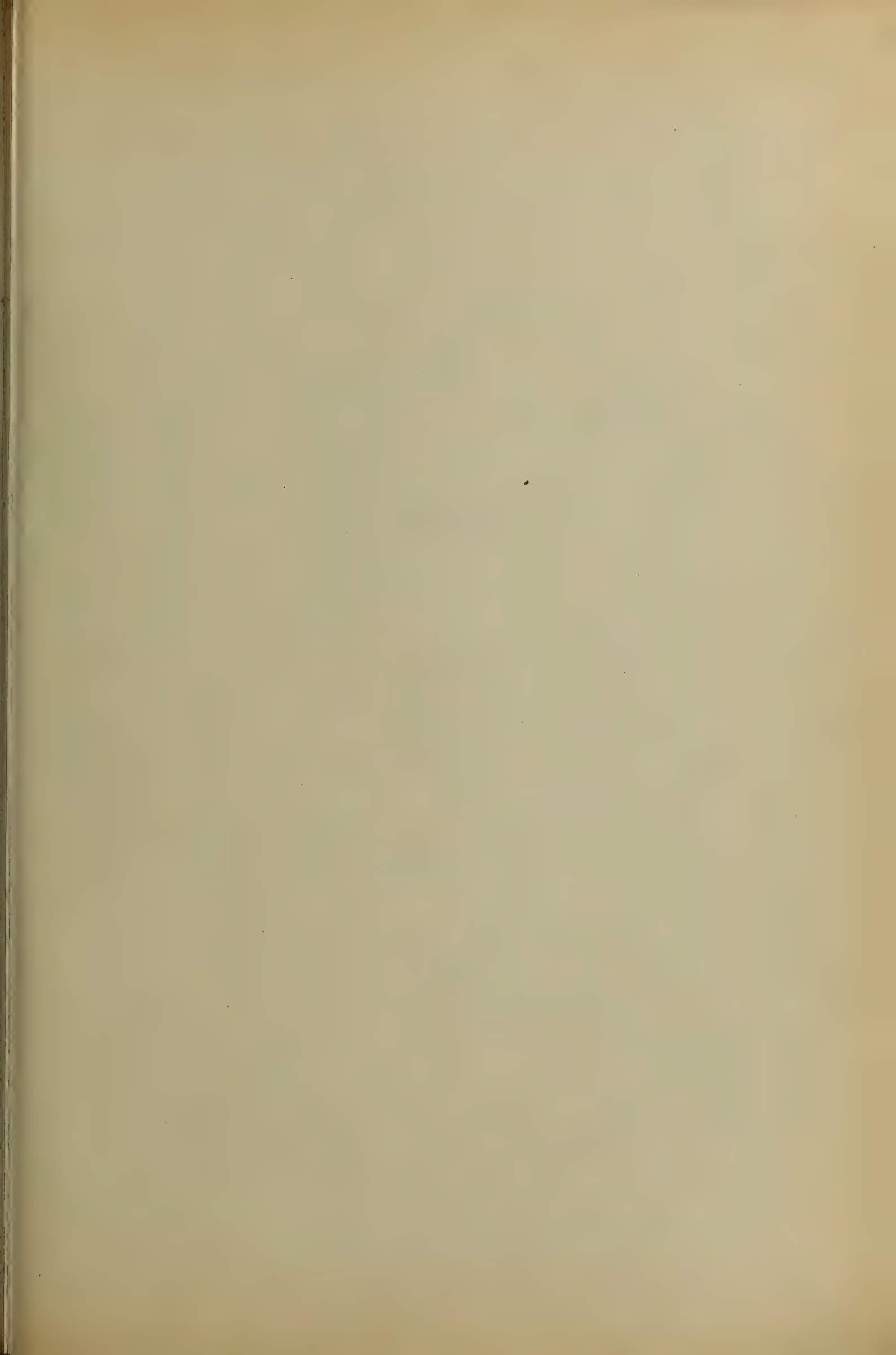
10. In a device of the character described, a revoluble plate carrying a grating, a reciprocating hopper carried by said plate above said grating, and means for revolving the two and reciprocating said hopper. 105

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.
FRANK L. CAPPS.

Witnesses:

JOHN B. McCABE,
A. B. KEOUGH.



No. 865,769.

PATENTED SEPT. 10, 1907.

L. DEVINEAU.
PHONOGRAPH.

APPLICATION FILED JUNE 18, 1906.

3 SHEETS—SHEET 1.

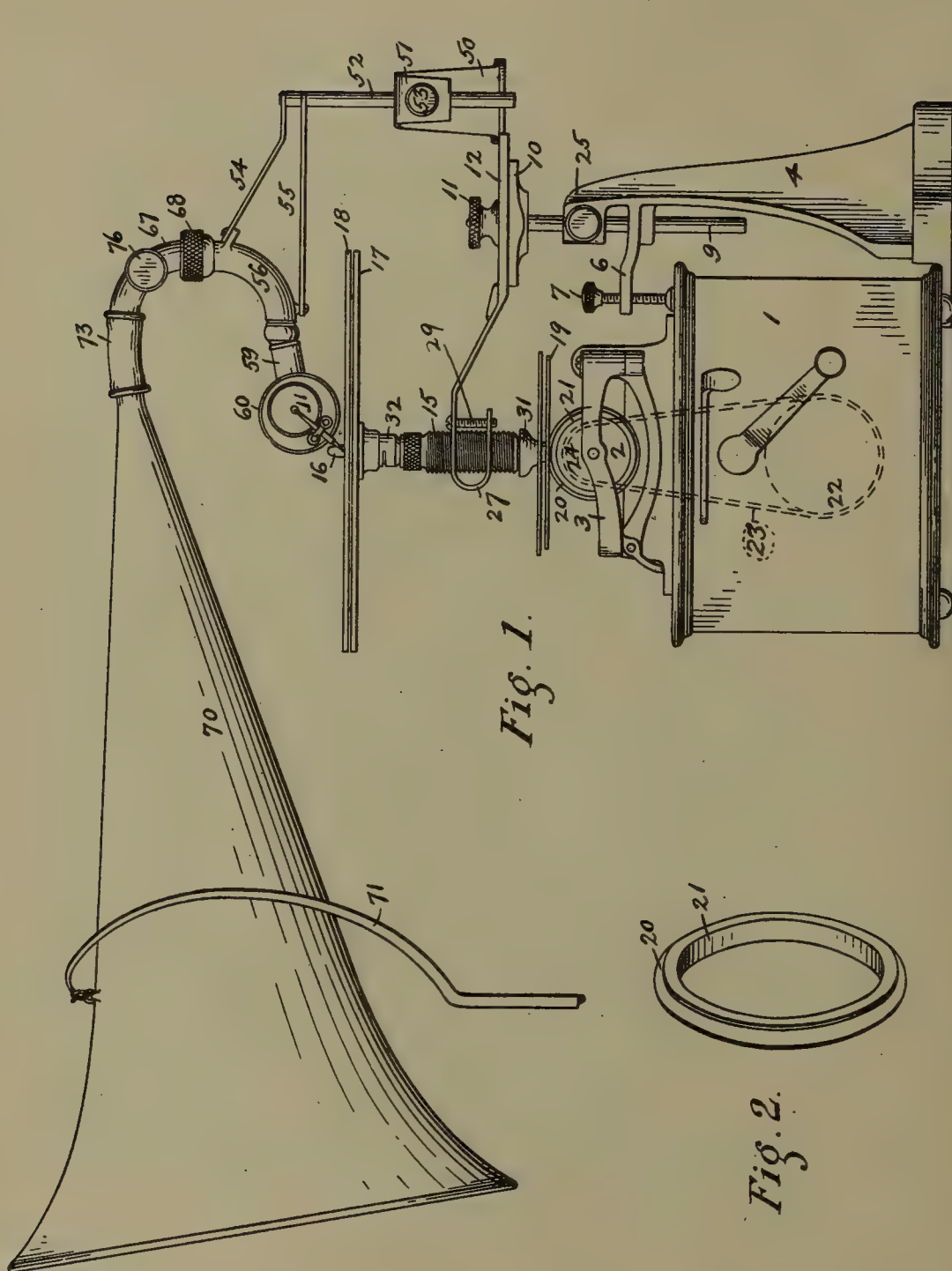


Fig. 1.

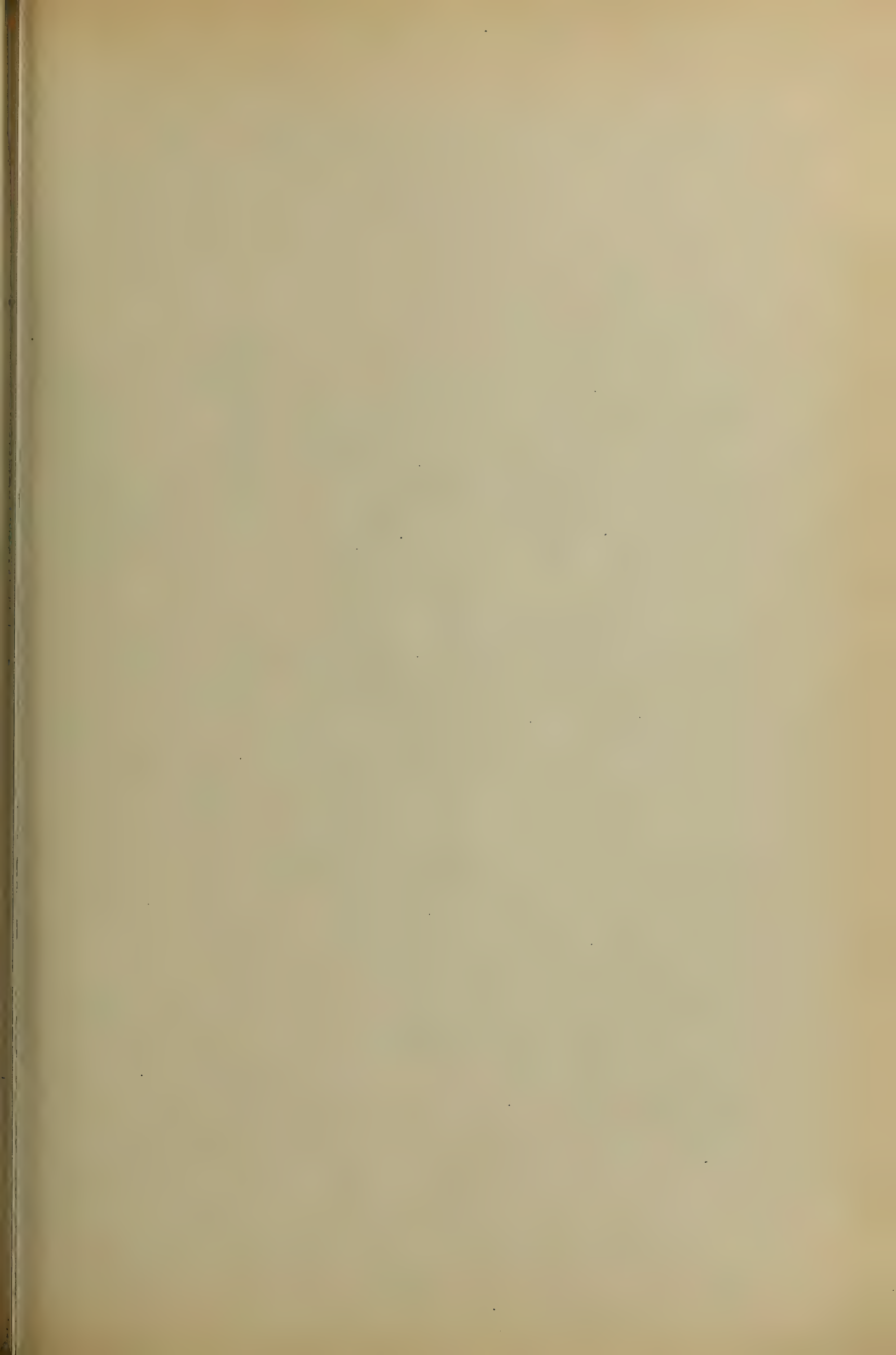
Fig. 2.

WITNESSES.

Ludo H. Keller.
Brennan West.

INVENTOR.

Louis Devineau
By Bates, Fouts & Hull,
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No. 865,769.

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3 SHEETS—SHEET 2.

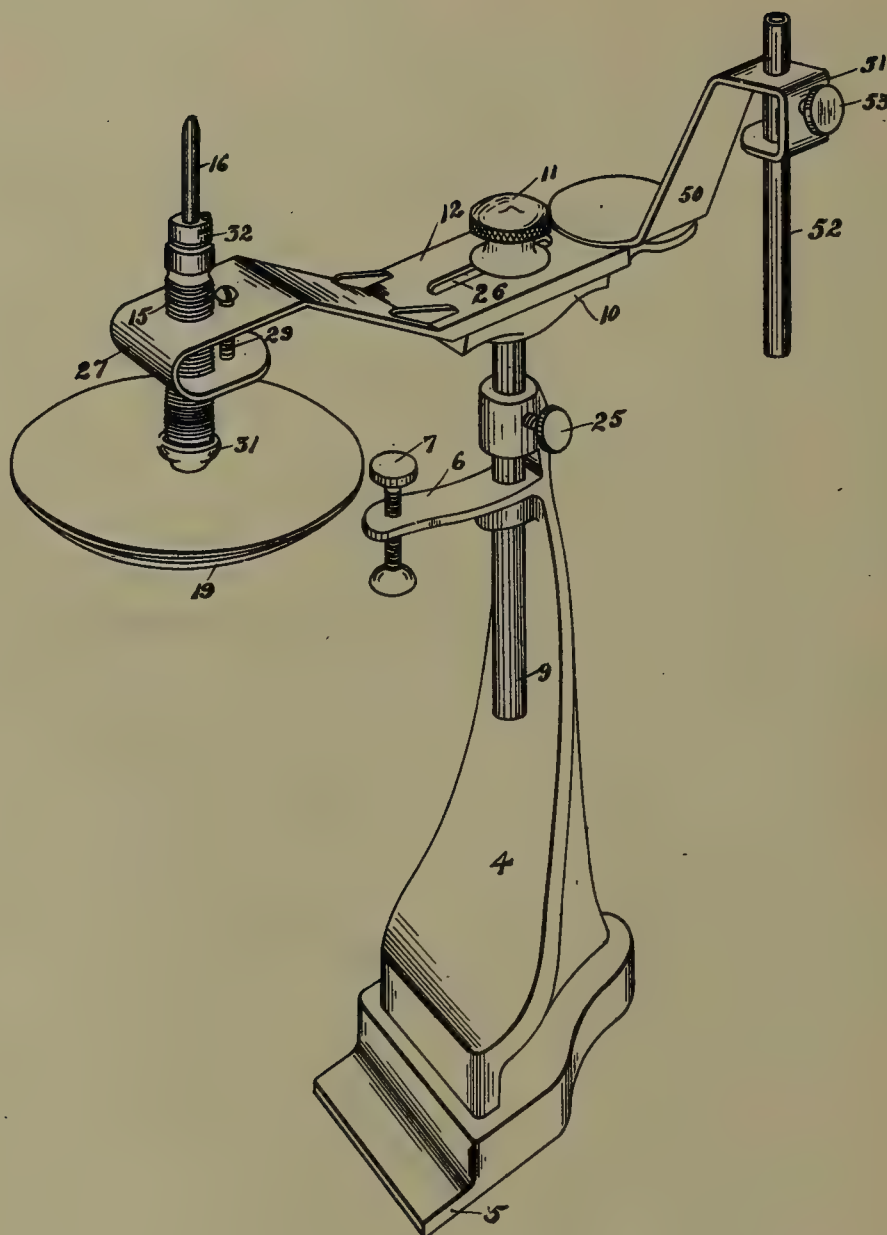


Fig. 3.

WITNESSES.

Ludo H. Keller.

Brennan West.

INVENTOR.

Louis Devineau

By Bates, Foulis & Hull

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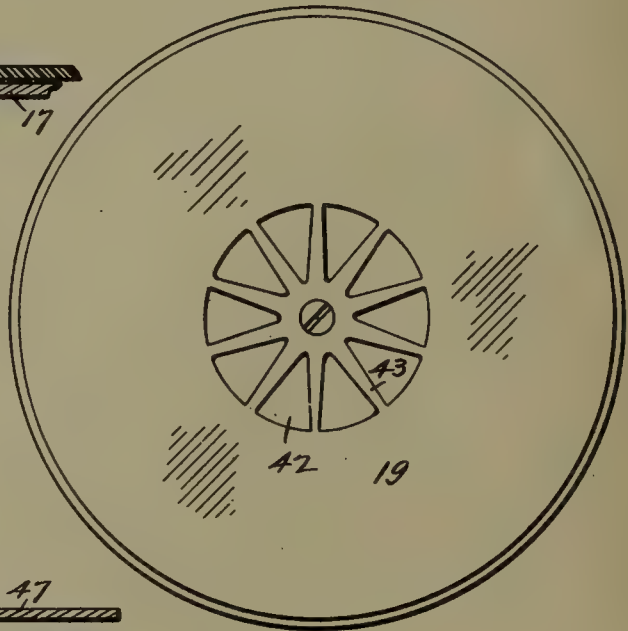
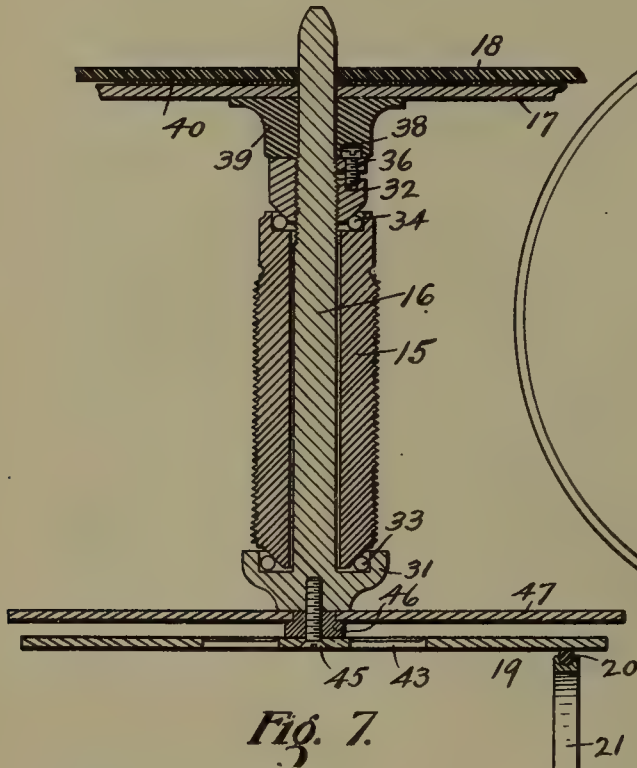
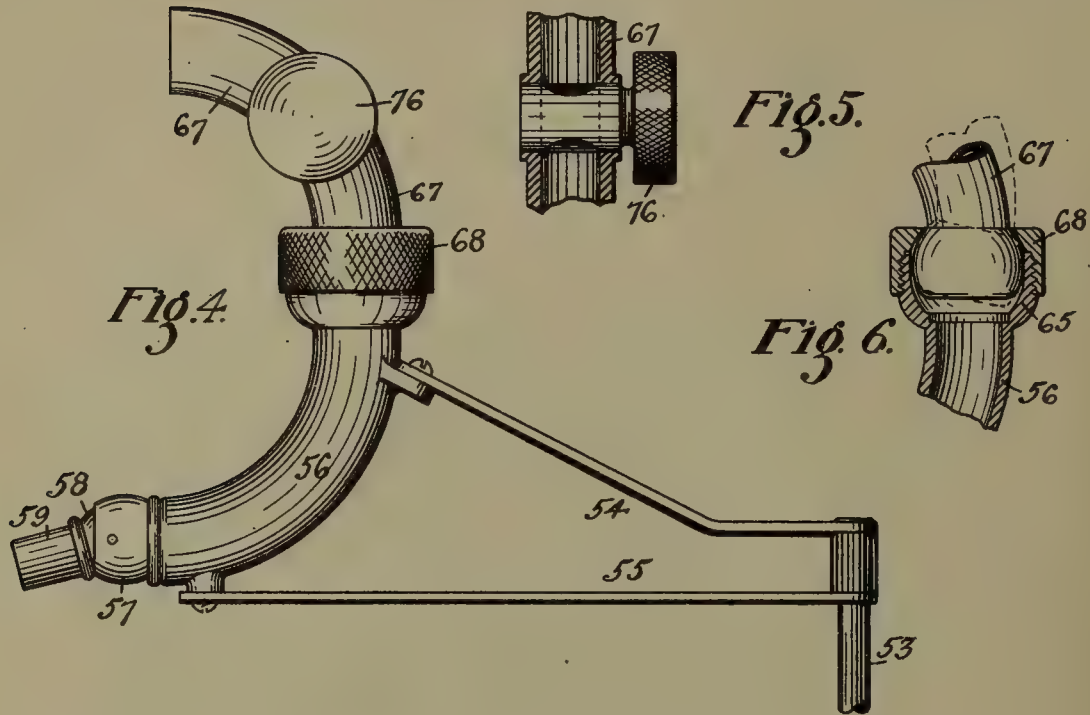
No. 865,769.

PATENTED SEPT. 10, 1907.

L. DEVINEAU.
PHONOGRAPH.

APPLICATION FILED JUNE 18, 1906.

3 SHEETS—SHEET 3.



WITNESSES.
Louis H. Keller.
Brennan B. West.

INVENTOR.
Louis Devineau,
By *Bates, Forts & Hull,*
ATTYS.

UNITED STATES PATENT OFFICE.

LOUIS DEVINEAU, OF CLEVELAND, OHIO.

PHONOGRAPH.

No. 865,769.

Specification of Letters Patent.

Patented Sept. 10, 1907.

Application filed June 18, 1906. Serial No. 322,243.

To all whom it may concern:

Be it known that I, LOUIS DEVINEAU, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain
5 new and useful Improvement in Phonographs, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The object of this invention is to provide mechanism whereby either disk or cylinder records may be used
10 on the same phonograph.

More particularly the invention comprises an attachment for a cylinder phonograph arranged to properly rotate disk records.

The invention, including this and other features, is
15 hereinafter more fully described and the essential characteristics set out in the claims.

Figure 1 is an end view of a phonograph with my arrangement and with a suitably supported horn; Fig. 2 is a perspective of the driving ring; Fig. 3 is a perspective view of my disk-rotating mechanism detached; Fig. 4 is enlarged side view of the supporting pipe for the reproducer and horn; Fig. 5 is a section showing a valve in such pipe; Fig. 6 is a section showing a ball joint in the pipe; Fig. 7 is a vertical section through the disk-carrier and its shaft; Fig. 8 is a bottom plan of the horizontal driving disk.
20 25

The same letters of reference designate the same part in each figure.

Referring to the parts by numerals: 1 represents the
30 box-like base of an ordinary cylinder phonograph on which is mounted the rotatable mandrel 2, supported at its free end by the hinged gate 3, and adapted to carry the ordinary cylinder record.

My mechanism is supported by a standard 4, which
35 has a flange 5, extending under the box 1, and an arm 6, which carries a thumb screw 7, bearing down on the top of the box. This holds the standard firmly in place.

Slidingly carried on the standard is a rod 9, at the
40 upper end of which is a head 10. Clamped on this head by thumb nut 11, is a plate 12, which carries a sleeve 15. Journaled within this sleeve is a shaft 16, the upper end of which carries a disk 17, adapted to support the record 18, while the lower end carries a
45 disk 19, adapted to engage a rubber tire 20, on a ring 21, surrounding the mandrel and fitting tight thereon. By this means the disk record 18, is rotated by the mechanism which ordinarily rotates the cylinder record on the mandrel 2. The mandrel is driven by any suitable
50 mechanism within the box as indicated by dotted lines in Fig. 1, where 22 represents a motor, from which runs a belt 23, onto a pulley 24, on the shaft of the mandrel.

There are various refinements and adjustments in the parts referred to which I will now describe. The rod
55 9, is clamped to the standard 4, by a set screw 25, which allows vertical adjustment as well as swinging on the

rod as an axis. The clamping nut 11, screws onto the upper end of the rod 9, which extends through a slot 26, in the plate 12, wherefore this plate may be adjusted in and out. By this means the disk 19, may be located
60 as desired over the driving ring 20, the speed of rotation of the disk being governed by the distance between its center and the point of engagement of the ring 20.

The plate 12, is bent near its end into substantially a U-shape as shown at 27, and the sleeve 15 has a
65 screw thread on its outer side which screws through said openings in the two portions of the plate 12. This furnishes means for adjusting the sleeve up and down. Moreover a screw, 29 engaging the two portions of the plate 12, is adapted to move the free end toward or
70 from the intermediate portion of the plate, thus causing the thread to bind and taking the place of a jam nut.

The shaft 16, is journaled within the sleeve 15, on a ball bearing provided by a cup 31, formed at the lower end of the shaft, and a nut 32, screw threaded on
75 the shaft above the sleeve. Sets of balls 33 and 34, roll between the cup 31, and the lower end of the sleeve 15, and between the upper end of the sleeve and the nut 32 respectively. The nut 32, is jammed by having a portion 36, which is separated by a kerf from the rest
80 of the nut and may be sprung by a nut 38, screwing through the portion 36, into the body of the nut. The disk 17, which supports the record has a hub 39, in the lower face of which is a recess to receive the head of the screw 38, thus compelling the disk to rotate with the
85 shaft. A piece of felt or other suitable material 40, is secured to the upper face of the disk 17, and the record 18 rests thereon and is driven by friction.

In order to obtain the proper friction between the driving ring 20, and the disk 19, I give that disk a
90 spring action by making it of thin metal and cutting out sector-shaped openings 42, to leave a series of spokes 43, carrying the disk. This allows the disk to bear on the ring with sufficient friction, the barrel
95 15, being screwed downwardly sufficiently to cause the disk 19, to be bent upward slightly on the side engaging the ring 20. The disk 19, is secured by a screw 45, screwing through it and through a washer 46, into the end of the shaft 16. An annular recess formed on this washer provides means for clamping the disk
100 47, between the washer and the end of the shaft. This disk 47, forms a guard over the friction drive preventing anything accidentally passing between the driving members or dropping into the openings 42.

The reproducing mechanism which coöperates with
105 the disk is also carried by the plate 12. At its outer end this plate has an upturned portion 50, which is then turned horizontally and downward as at 51. A tube 52, fits in this horizontal web and is clamped by a set screw 53, in the downward flange 51. This tube
110 may thus be adjusted up and down. Loosely mounted in the tube is a rod 53, rigid with which are arms 54 and

55, the outer ends of which are connected by screws with lugs on the tube 56, which is formed as an elbow, as shown. At the lower end of this tube is a portion 57, which is a segment of a sphere, and in this segment 5 is pivoted the partially spherical end 58 of the neck 59 of the sound box. The sound box has a cylindrical extension 60, from this neck which carries the diaphragm 61, with which coöperates the reproducing needle 62. By reason of the pivot between the heads 10 57 and 58, this reproducing needle can play up and down, while the journaling of the rod 53 in the tube 52 allows the reproducer to swing laterally under the influence of the spiral groove on the record disk.

On the upper end of the elbow 56 is formed a partially spherical recess 65, in which seats the lower partially spherical head 66 of an upper elbow 67. This head is freely held in place by the nut 68, but is allowed movement to make an easy connection between the horn and the elbow 56. The horn, designated 70, is supported in any suitable manner, as indicated by the stand 71, which is selected as illustrative. On the inner end of the horn is a rubber section 73, which connects the horn with the upper end of the elbow 67.

25 To regulate the degree of sound, I provide a valve in the passageway from the sound box to the horn. This valve, as shown in the drawing, consists of a plug 75, seating in the elbow 67, and carrying a knurled head 76, by which it may be turned, there being a large cylindrical passageway through the plug so that 30 it may leave the bore of the elbow 67, unobstructed, or reduce it as desired. The friction of the plug with the walls of the tube is sufficient to hold the plug in place.

35 To produce proper sound it is necessary not only that the disk be rotated and the reproducer supported in engagement therewith, but that such rotation be easy, and without jerk or irregularity. The reproducer needle must rest lightly and easily thereon and 40 there must be no scratching or scraping of any kind. These results are obtained by the various adjustments and refinements in my mechanism as above explained. Moreover my adjustments allow my mechanism to be attached to cylindrical phonographs of various sizes. 45 There are a large number of such phonographs in existence and frequently it is desired to reproduce a record which does not exist in the cylinder form but does in the disk form. My mechanism enables the disk records to be operated by the cylinder phonograph whenever 50 desired. At the same time it may be instantly removed to allow cylinder records to be used.

Having thus described my invention, I claim:—

1. The combination with the mandrel of a cylinder phonograph of a friction ring adapted to be carried thereby, a horizontal disk adapted to support the disk record, a vertical shaft carrying said disk, a second disk at the lower end of said shaft adapted to engage said ring, and a bearing for said shaft between the two disks.

2. In a driving mechanism for disk records, the combination of a horizontal disk, a vertical shaft connected therewith, a spring disk at the lower end of such shaft, and a rotatable driving member adapted to engage the lower disk.

3. In a driving mechanism for disk records, the combination of a horizontal record support, a vertical shaft connected therewith, a disk at the lower end of such shaft, a

bearing for the shaft between the record support and disk, a rotatable driving member adapted to engage the lower disk, and a cylinder phonograph having means engaging the under side of said disk.

4. The combination of a suitable support, of a bracket 70 adjustably carried thereby, a barrel screw-threaded in said bracket, a shaft journaled in said barrel, a disk supported on the upper end of said shaft, a driving disk on the lower end of said shaft, and a coöperative driving member adapted to engage such lower disk. 75

5. The combination with a suitable support adapted to be clamped to a phonograph box, a bracket adjustably carried by the support, a barrel adjustable within the bracket, a shaft journaled in the barrel, a disk on the upper end of the shaft, a disk on the lower end of the shaft, a phonograph and a friction member rotatable by the phonograph and engaging the disk on the lower end of the shaft. 80

6. The combination with a suitable support adapted to be clamped to a phonograph box, a bracket adjustably carried by the support, a barrel adjustable within the bracket, a shaft, journaled on ball bearings in the barrel, a disk on the upper end of the shaft, a disk on the lower end of the shaft, a phonograph mandrel, and a friction ring adapted to fit on said mandrel and engage the disk on the lower end of the shaft. 85 90

7. The combination with a bracket, a rod adjustably carried thereby, a plate supported by said rod and adjusted laterally thereon, a barrel carried by said plate, a shaft located in said barrel and having a ball bearing connection therewith, and means for supporting a record carried by said shaft. 95

8. The combination with a suitable support adapted to be clamped to a phonograph box, of a bracket adjustably carried by said support, a barrel adjustable within the bracket, a shaft journaled in the barrel, a record support carried by said shaft above the barrel, and means connected with said shaft below the barrel for rotating it. 100

9. The combination of a suitable support vertically adjustable, a horizontally adjustable plate carried by said support, a shaft carried by said plate, a record support adapted to be driven by said shaft, means for driving said shaft, a tube, a reproducer carried thereby for co-operating with the record, a vertically adjustable support for said tube, said support being carried by said plate. 105 110

10. The combination with a cylinder phonograph of a standard adapted to be clamped to the box of the phonograph, a bracket adjustably carried by the standard, a reproducer, an adjustable swiveled support therefor carried by the bracket, a rotatable shaft carried by the bracket, a disk at the upper end of said shaft adapted to carry a record coöperating with the reproducer. 115

11. The combination, with a cylinder phonograph having a mandrel, of a standard adapted to be clamped to the box of the phonograph, a bracket adjustably carried by the standard, a reproducer, an adjustable swiveled support therefor carried by the bracket, a rotatable shaft carried by the bracket, a disk at the upper end of said shaft adapted to carry the record coöperating with the reproducer, a disk at the lower end of the shaft, and a friction ring on the mandrel and engaging the last mentioned disk. 120 125

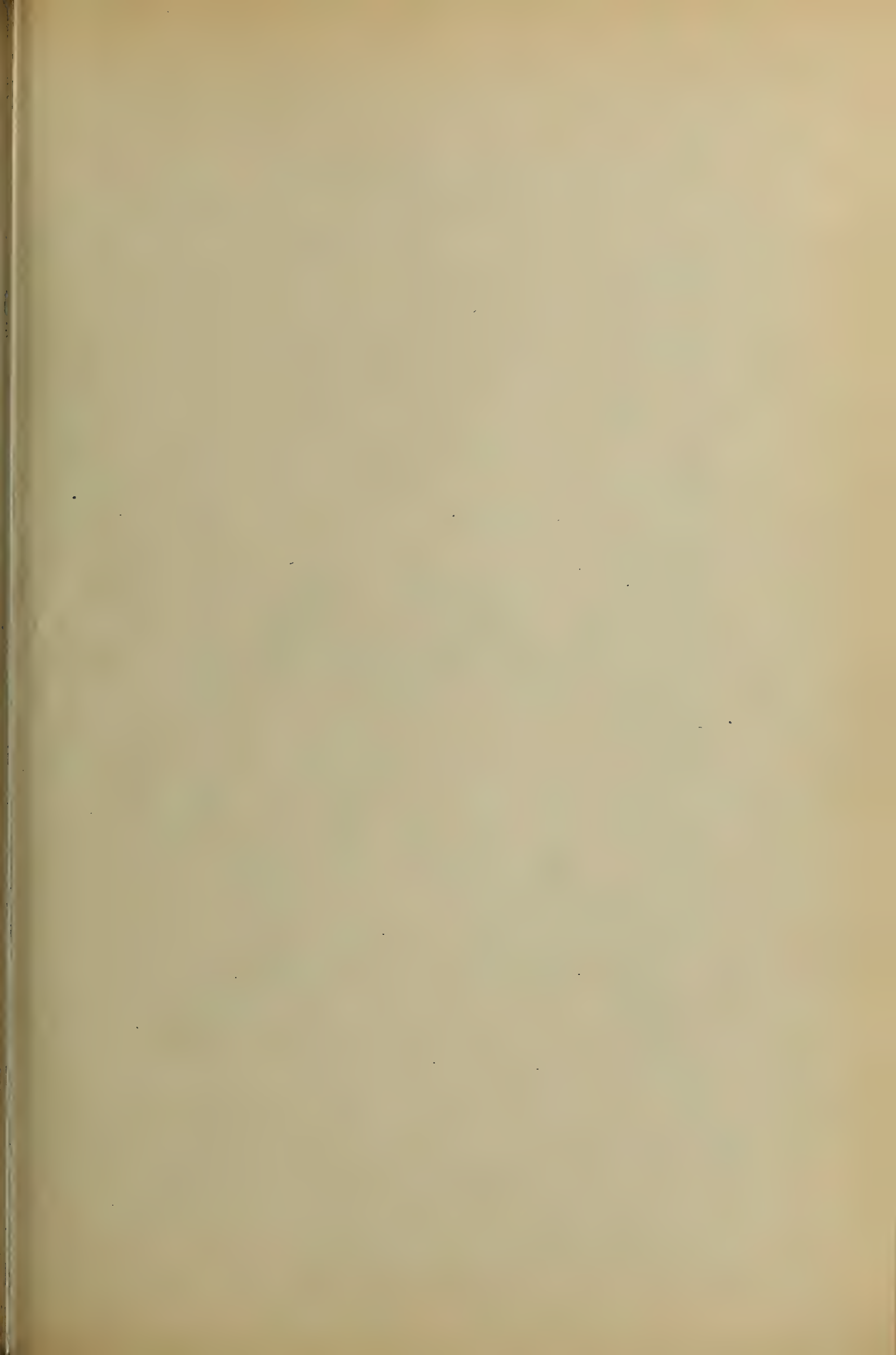
12. The combination, with a cylinder-phonograph having a mandrel, of a standard adapted to be clamped to the box of the phonograph, a vertical rod adjustably mounted in said standard, a cross plate carried by said rod, a sound tube and reproducer, an adjustable swiveled support therefor carried by the cross plate, an adjustable barrel carried by the cross plate, a shaft in said barrel, a disk at the upper end of said shaft adapted to carry the record coöperating with the reproducer, a disk at the lower end of said shaft, and a friction ring adapted to fit on the mandrel and engage the last mentioned disk. 130 135

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

LOUIS DEVINEAU.

Witnesses:

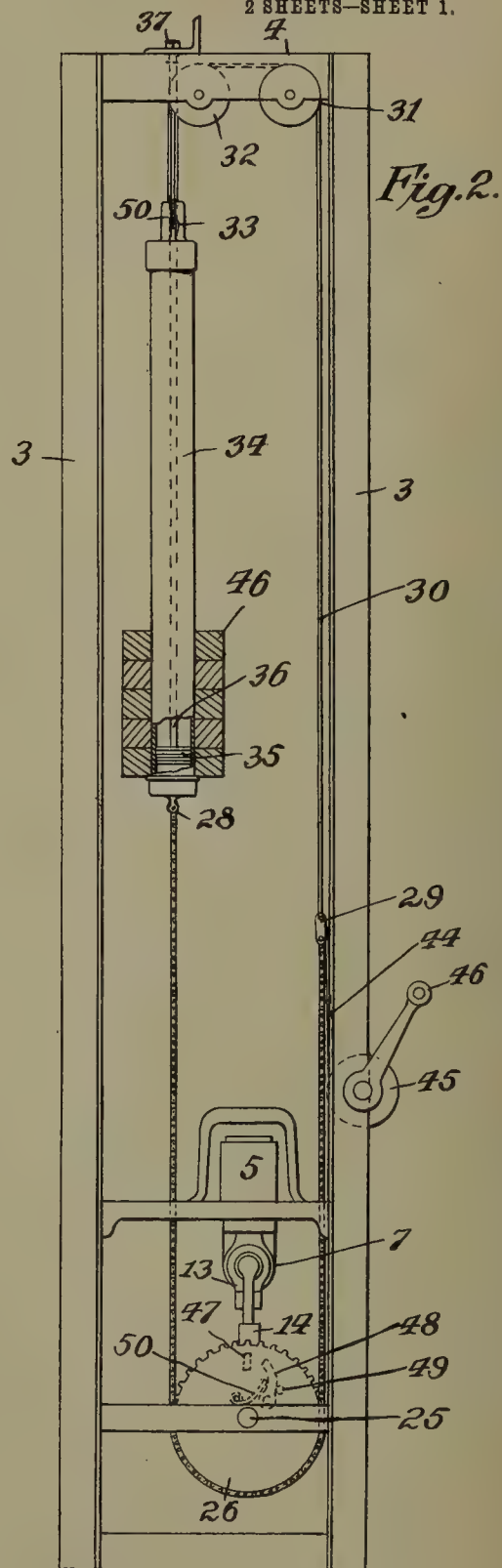
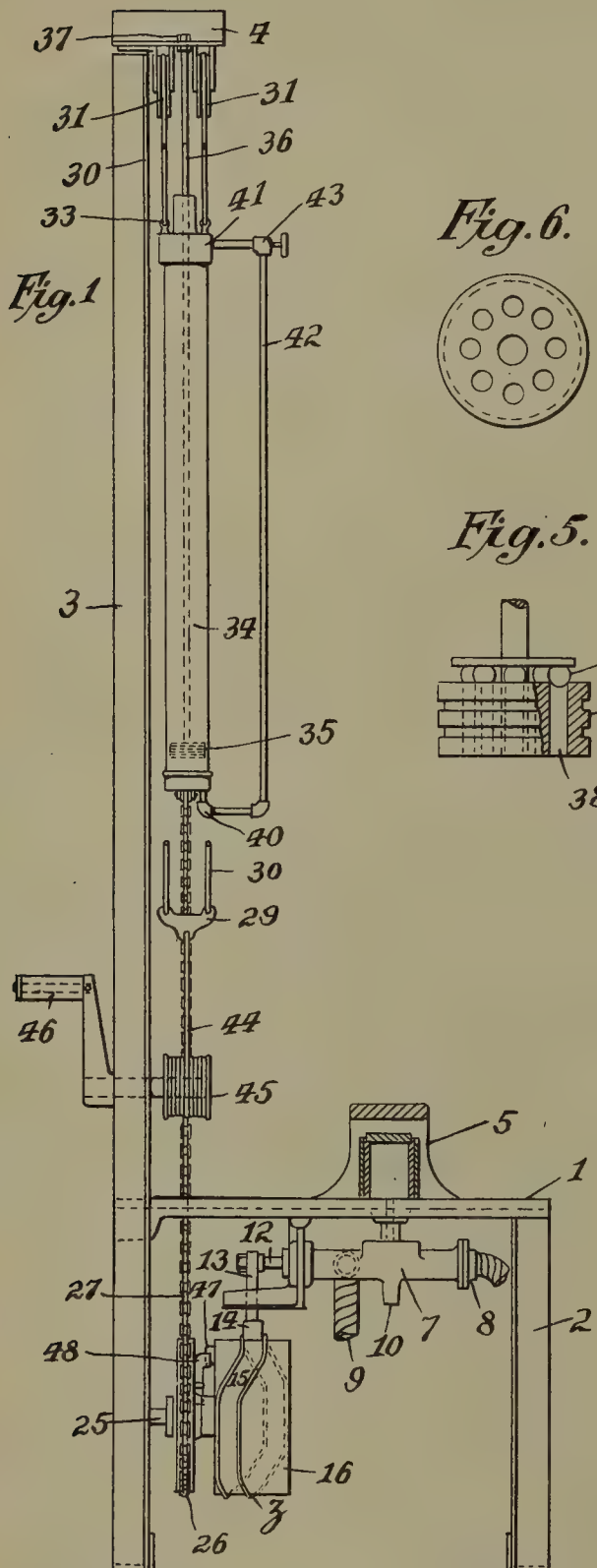
ALBERT H. BATES,
BRENNAN B. WEST.



C. A. REINERS.
PHONOGRAPH RECORD MAKING MACHINE.

APPLICATION FILED APR. 17, 1906.

2 SHEETS—SHEET 1.

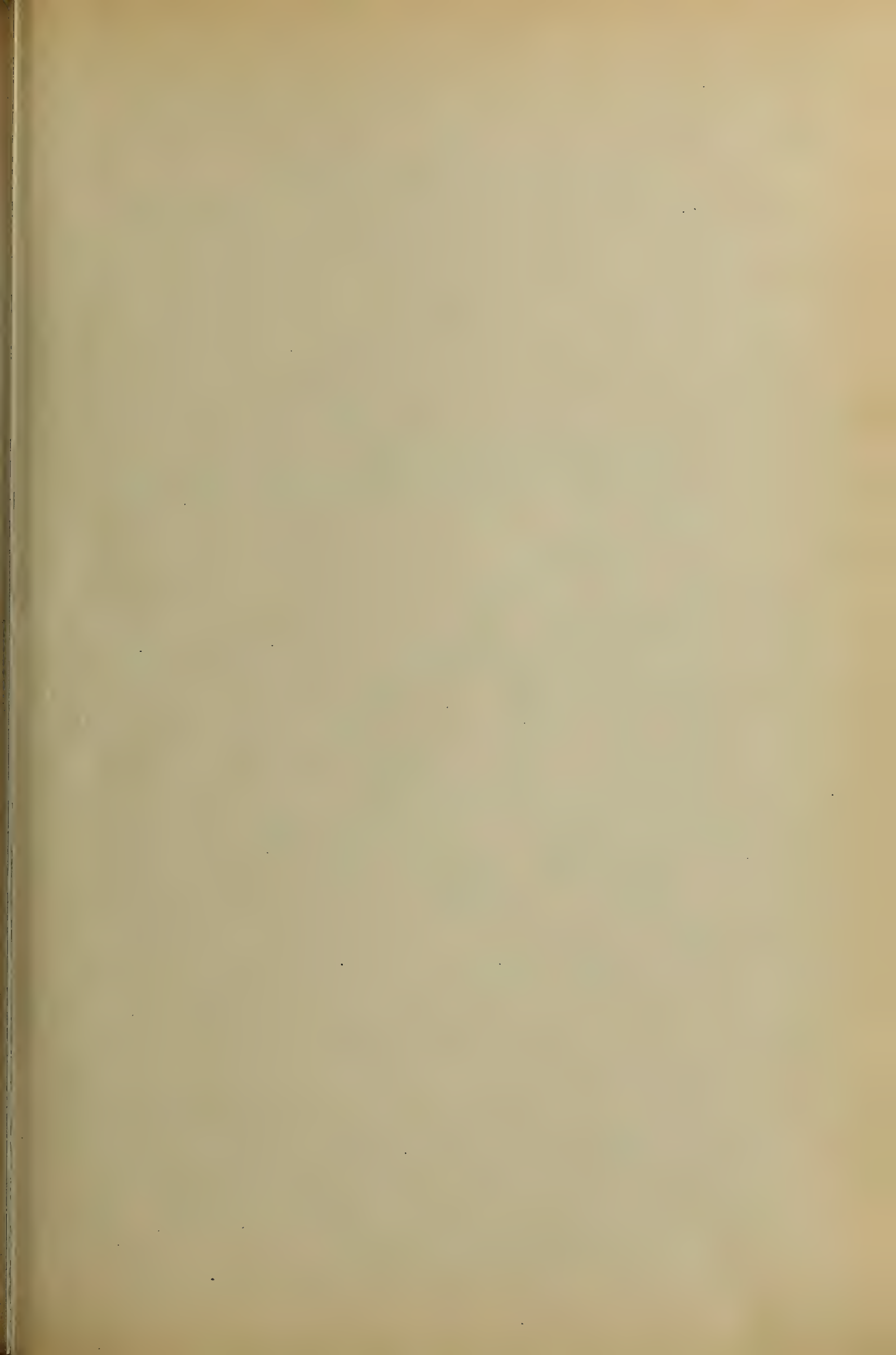


Attest:

Edgeworth Bruce
F. W. Wright

Inventor:

CHARLES A. REINERS.
by *Amos Rutwell*
Att'y.



No. 866,219.

PATENTED SEPT. 17, 1907.

C. A. REINERS.
PHONOGRAPH RECORD MAKING MACHINE.
APPLICATION FILED APR. 17, 1906.

2 SHEETS—SHEET 2.

Fig. 3.

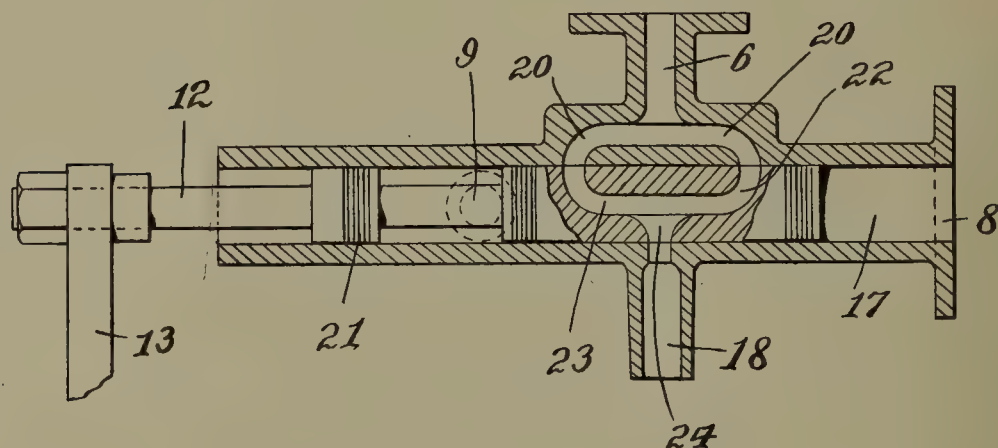
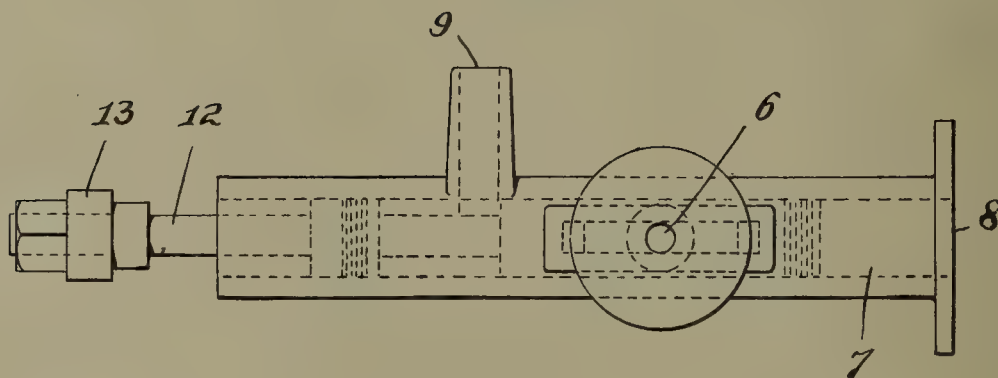


Fig. 4.



Attest:
Edgeworth Reine
F. W. Wright

Inventor:
CHARLES A. REINERS.
by *Edgeworth Reine*
Att'y.

UNITED STATES PATENT OFFICE.

CHARLES A. REINERS, OF HOBOKEN, NEW JERSEY, ASSIGNOR TO EVANS PHONOGRAPH RECORD COMPANY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH-RECORD-MAKING MACHINE.

No. 866,219.

Specification of Letters Patent.

Patented Sept. 17, 1907.

Application filed April 17, 1906. Serial No. 312,081.

To all whom it may concern:

Be it known that I, CHARLES A. REINERS, a citizen of the United States, residing at Hoboken, New Jersey, have invented certain new and useful Improvements
5 in Phonograph-Record-Making Machines, of which the following is a clear, full, and exact description.

The object of this invention is to provide a machine for producing phonograph records which will insure a perfect and uniform product, at the expenditure of as
10 little labor, time and power as possible.

In carrying out this invention I make use of a frame or table carrying the usual chamber for holding the blank within an interiorly configured matrix to which
15 blank there is first admitted steam or other heated fluid under pressure to soften and expand the blank into the matrix. I prefer to provide means for then exhausting said steam and for admitting a cooler fluid, preferably
20 compressed air, to cool and shrink the blank to permit its removal. This operation is old and well known in the art and needs little explanation.

According to my invention I provide means for determining the length of time to be occupied by the foregoing cycle of operation, which I prefer to effect by means of a dash pot cylinder and piston weighted so as
25 to slowly fall by gravity and operatively connected to the valve means for controlling the said cycle of operation. I also provide means for proportioning the length of time in which the various or different fluids have access to the matrix chamber during such cycle. I prefer
30 to use a cam for this purpose which I prefer to have operate by a single slide valve stem for connecting said chamber with steam, exhaust or air pressure. I also provide means to insure a proper initial position of the cam and valve before operation of the cam, whatever
35 be the elevation to which the cylinder is raised.

My invention will be pointed out in the claims and a preferred embodiment thereof at length and specifically pointed out in the following description.

In the drawings, Figure 1 is a side elevation of a machine of my invention; Fig. 2 is a rear elevation of the same with the cylinder partly in section; Fig. 3 is a central longitudinal section of a preferred form of valve;
40 Fig. 4 is a plan of the same; Fig. 5 is a side elevation partly in section of the piston; and Fig. 6 is a plan of the same.

As shown in the drawings, the preferred embodiment of my invention consists of a platform or table 1 mounted on short front legs 2, and upon supporting posts 3 at the rear which extend for some distance above the table.
50 The table is provided with an opening *a* over which the ordinary matrix 5 and its means for holding a blank are located, the same being but diagrammatically shown in these drawings as it forms no novel part of this invention and may be of any of the well known
55 forms. Beneath the opening *a* there is secured a valve

casing 7 having a port 6 to the table opening *a*, a steam inlet 8 at its forward end, and an air inlet 9 to the rear of the port 6. An exhaust opening 18 to the casing is preferably formed opposite the aforesaid port 6 to the table top. The valve stem 12 is provided with a piston
60 slide valve 19 provided with two by-passes 22 and 23 merging into a common port 24 to the exhaust 18 and the casing 7 is provided with two similar by-passes 20 which at times hereinafter stated will register with the by-passes of the piston slide valve to open communi-
65 cation from the matrix to the exhaust. The stem 12 carries a second piston 21 near the rear end of the valve casing, and so disposed with relation to the air inlet port 9 that air will be directed by the left by-pass 20, to the passage 6 after exhaust is closed upon the inward
70 movement of the valve stem. A bracket 11 having guide arms extending below and parallel to the stem 12, serves to guide a vertical arm 13 secured to the end of the valve stem 12 and to prevent its rotation. This
75 arm 13 carries a roller 14 at its lower end which is engaged by the cam groove 15 of the cam 16 which is loosely mounted on the cam shaft 25.

The cam groove 15 as shown in Fig. 1 consists of two extreme portions, one indicated by the space between dotted lines *y* and the other indicated by the space
80 within the dotted lines *x*. In the position shown in that figure the parts are at rest and ready for operation, in which case the roller 14 rests between the two parts *y* and *x* resulting in the slide valve occupying a position, shown in Fig. 3 with the opening 6 open to the exhaust.
85 Upon rotation of the cam by means hereinafter to be described, roller 14 will be caused to occupy a position in the part *y* of the cam groove, when steam will be admitted to the right-hand by-pass 20, the air and exhaust of course being closed at this period. The length
90 of this part *y* of the cam determines the proportion of time that steam will be admitted to the matrix during one revolution of the cam. As the roller 14 leaves the part *y* so as to occupy the part *x*, it moves the slide valve to the right and either momentarily opens it to the ex-
95 haust or if desired opens it for an appreciable length of time thereto, and passing on takes up a position within the part *x* so that air will be forced into the matrix to cool the same, the length of said part *x* determining the proportion of time during which air or other cooling
100 medium shall be admitted to the matrix.

In order to determine the length of time of one operation, or the sum of the time of connecting steam, exhaust and cooling air, I make use of the following instrumentalities. On the cam shaft 25 I mount a
105 sprocket wheel 26 freely rotatable thereon and carrying on its inner face a pawl 48 bearing against a stop pin 49 and having a spring 50 to hold it thereagainst, while the cam body 16 is provided with one abutment or tooth 47, so positioned with relation to the pawl that it
110

will stop in the position shown in these figures after at least a complete rotation of the sprocket wheel 26. To secure rotation of the sprocket wheel in a determined length of time, I make use of a chain 27 fitting the periphery of the wheel and secured at one end to an eye 28 in the lower end of a vertically movable cylinder 34, while the other end of the chain 27 I may secure to a cross head 29 connected by two parallel chains or ropes 30, which pass over overhead pulleys 31, 32 and are secured at 33 to the top of said cylinder 34, so that an endless chain effect is produced including, in its circuit the chain 27, the cylinder 34 and the wire rope 30 and cross head 29. The cylinder 34 is preferably formed with an outlet 40 at its lower end and an outlet 41 at its upper end connected by a by-pass 42 having an adjustable valve 43 herein shown as at the upper part thereof. A stationary piston 35 secured to a piston rod 36 passing through a stuffing box 50 at the top of the cylinder, is firmly bolted in place in the overhead cross beam 4. The piston is formed with a number of vertical passages through its body, in the upper face of which are set balls 39 to form a check valve. In order to raise the cylinder into the position shown, a windlass 45 is shown having a handle 46 and connected by a chain or rope 44 to the cross head 29. Weights 49 may be provided for the cylinder.

In operation the windlass is wound so as to lower the cross head 29 and thereby pull the cylinder 34 into the position shown in Figs. 1 and 2, at the same time rotating the sprocket 26 in a clockwise direction, so that the pawl 48 will merely pass the tooth 47 without moving the cam. In raising this cylinder vertically it will be obvious that the liquid may be readily displaced through the vertical passages 38 of the plunger and thereby prevent any dash pot or retarding action. The cylinder will be raised as far as desired, which may be any distance which will have caused the pawl to have passed the tooth 47. Then the operator, if she has not already fixed her matrix in position, will do so before releasing the windlass, but upon releasing the same the cylinder will start to fall being retarded by the check valve effect of the piston which makes it necessary for the liquid as it is displaced from above to below the piston, to travel through the by-pass 42, the regulating valve 43 of which will have been regulated to determine the length of time of its fall to its position on top of the table 1. The distance which the cylinder falls after it has once caused the pawl to engage the tooth 47 until the cylinder is brought up with a dead stop against the table 1, should be equal to the circumference of the sprocket wheel 25 so that it will be rotated exactly one revolution. During the first part of the revolution, as hereinbefore described, the part *y* of the cam groove 15 will be caused to admit steam to the matrix. Then as the part represented by *z* takes hold of the roller 14, exhaust will be established with the matrix, allowing the steam to clear out of the same, and as the part *x* controls the roller, air or other cooling medium will be admitted to the matrix, and then the roller brought around to its initial starting position to close both supply ports and open the matrix to the outside air, when an operation will have been completed. It will be noted that the cam proportions the length of time during which the different media are admitted to the matrix, while the cylinder through its dash pot action determines the

length of time of the cycle of operation which includes the admission of these different media.

What I claim as my invention is:

1. A machine for producing phonograph records comprising a matrix chamber for the reception of the blanks, valved piping to said chamber, a valve, means having connections with a hot fluid supply, with a cooler fluid supply and with an exhaust, means for controlling the proportion of time said connections are in communication with the matrix chamber, in combination with a time determining means adapted to regulate the aggregate length of time during which aforesaid connections are established. 70
2. In combination with the valved means for supplying variable fluids to the matrix chamber of phonograph reproducing machines, a time determining means adapted to regulate the length of time of a cycle of operation for producing a finished blank. 80
3. In combination with the valved means for supplying variable fluids to the matrix chamber of phonograph reproducing machines, a time determining means adapted to regulate the length of time of a cycle of operation for producing a finished blank, said time determining means comprising a dash pot cylinder and piston, and connections between them and the valved means. 85
4. In combination with the valved means for supplying variable fluids to the matrix chamber of phonograph reproducing machines, a time determining means adapted to regulate the length of time of a cycle of operation for producing a finished blank, and means for proportioning the length of time of application of the individual fluids during said cycle. 90
5. In combination with the valved means for supplying variable fluids to the matrix chamber of phonograph reproducing machines, a time determining means adapted to regulate the length of time of a cycle of operation for producing a finished blank, said time determining means comprising a dash pot cylinder and piston, and connections between them and the valved means, said piston being stationary and means for moving said dash pot cylinder at will relatively thereto. 100
6. In combination with the valved means for supplying variable fluids to the matrix chamber of phonograph reproducing machines, a time determining means adapted to regulate the length of time of a cycle of operation for producing a finished blank, said time determining means comprising a dash pot cylinder and piston, and connections between them and the valved means, said piston being stationary and means for moving said dash pot cylinder at will relatively thereto, a check valve in said cylinder and a restricted by-pass from end to end of said cylinder. 105
7. In combination with the valved means for supplying variable fluids to the matrix chamber of phonograph reproducing machines, a time determining means adapted to regulate the length of time of a cycle of operation for producing a finished blank, a common actuating means for said valved means, a movable dash pot cylinder connected to said actuating means, means for elevating said cylinder, a stationary piston for the same, whereby the fall of the cylinder will actuate the valved means. 110
8. In combination with the valved means for supplying variable fluids to the matrix chamber of phonograph reproducing machines, a time determining means adapted to regulate the length of time of a cycle of operation for producing a finished blank, a common actuating means for said valved means, a movable dash pot cylinder connected to said actuating means, means for elevating said cylinder, a stationary piston for the same, whereby the fall of the cylinder will actuate the valved means, and means for permitting the raising of the cylinder without actuating the valved means. 115
9. In combination with the valved means for supplying variable fluids to the matrix chamber of phonograph reproducing machines, a time determining means adapted to regulate the length of time of a cycle of operation for producing a finished blank, a cam adapted to operate the valved means, a weighted cylinder operatively connected to said cam, and a retarding piston therein. 120
10. In combination with the valved means for supplying variable fluids to the matrix chamber of phonograph repro-

ducing machines, a time determining means adapted to regulate the length of time of a cycle of operation for producing a finished blank, a cam adapted to operate the valved means, a weighted cylinder operatively connected to said cam, and a retarding piston thereon, means to raise the piston without operating the cam.

11. In combination with the valved means for supplying variable fluids to the matrix chamber of phonograph reproducing machines, a time determining means adapted to regulate the length of time of a cycle of operation for producing a finished blank, a cam adapted to operate the valved means, a weighted cylinder operatively connected to said cam, and a retarding piston therein, said valved means having a single slide valve stem.

12. In combination with the valved means for supplying variable fluids to the matrix chamber of phonograph reproducing machines, a time determining means adapted to regulate the length of time of a cycle of operation for producing a finished blank, a cam adapted to operate the valved means, a weighted cylinder operatively connected to said cam, and a retarding piston therein, and a by-pass around said cylinder.

13. In combination with the valved means for supplying variable fluids to the matrix chamber of phonograph reproducing machines, a time determining means adapted to regulate the length of time of a cycle of operation for producing a finished blank, a cam adapted to operate the valved means, a weighted cylinder operatively connected to said cam, and a retarding piston therein, a by-pass around said cylinder, and a check valve in the piston.

14. In combination with the valved means for supplying variable fluids to the matrix chamber of phonograph reproducing machines, a time determining means adapted to regulate the length of time of a cycle of operation for producing a finished blank, a cam adapted to operate the valved means, a weighted cylinder operatively connected to said cam, and a retarding piston therein, a by-pass

around said cylinder, and a regulating cock in said by-pass.

15. In combination with the valved means for supplying variable fluids to the matrix chamber of phonograph reproducing machines, a time determining means adapted to regulate the length of time of a cycle of operation for producing a finished blank, a cam adapted to operate the valved means, a weighted cylinder operatively connected to said cam, and a retarding piston therein, and means adapted to properly register the cam with the operating cylinder for its initial position.

16. In combination with the valved means for supplying variable fluids to the matrix chamber of phonograph reproducing machines, a time determining means adapted to regulate the length of time of a cycle of operation for producing a finished blank, a cam adapted to operate the valved means, a weighted cylinder operatively connected to said cam, and a retarding piston therein, and means adapted to permit the cylinder to overrun its travel without overrunning the initial position of the cam.

17. In combination with the valved means for supplying variable fluids to the matrix chamber of phonograph reproducing machines, a time determining means adapted to regulate the length of time of a cycle of operation for producing a finished blank, a cam adapted to operate the valved means, a weighted cylinder operatively connected to said cam, and a retarding piston therein, said operative connection comprising a sprocket wheel operated by a chain from said cylinder, a pawl carried thereby and a single tooth carried by the cam whereby the correct initial position of the cam is obtained by the revolution of the wheel.

Signed at New York city this 6th day of April 1906.

CHARLES A. REINERS.

Witnesses:

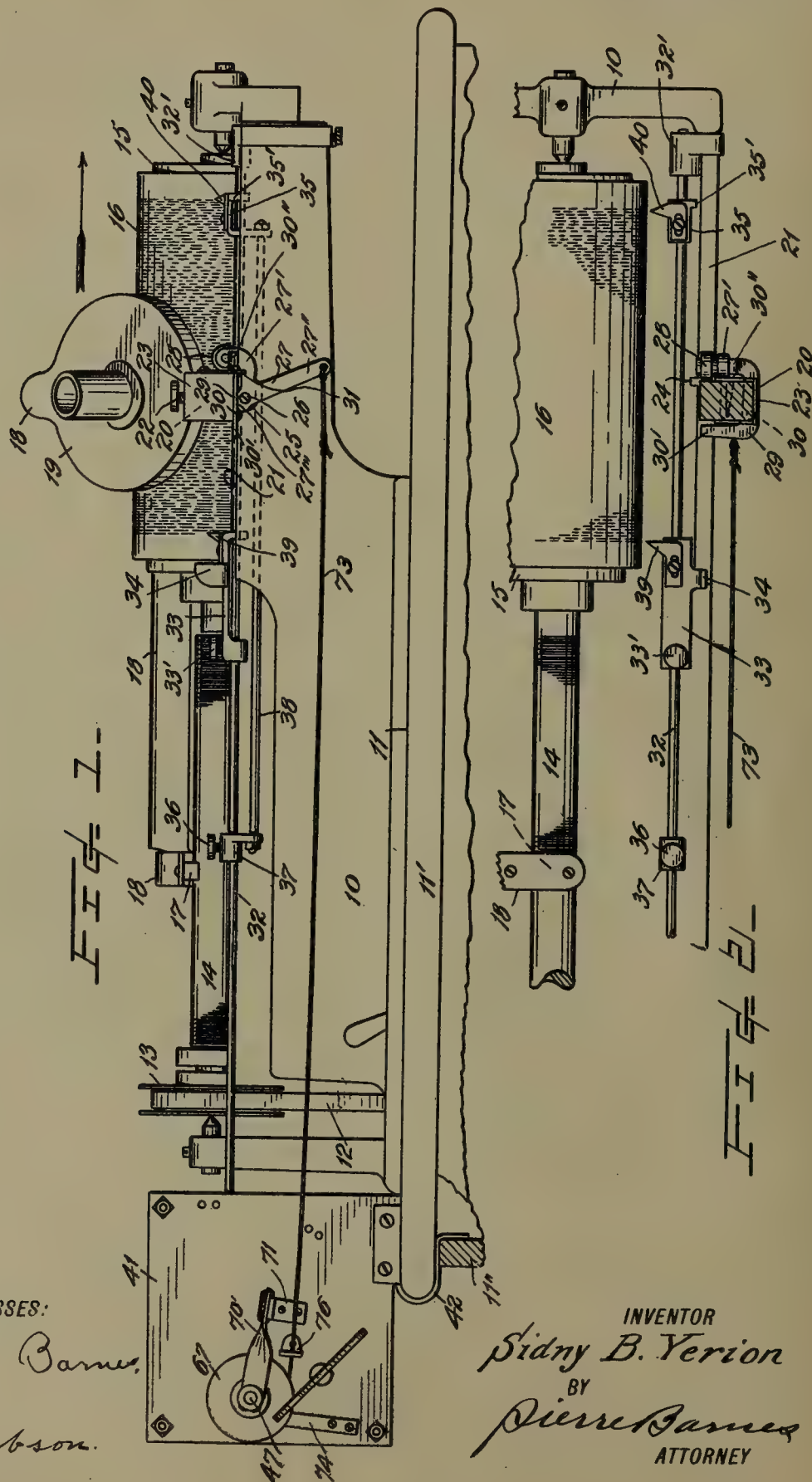
EMERSON R. NEWELL,
F. WARREN WRIGHT.

No. 866,552.

PATENTED SEPT. 17, 1907.

S. B. YERION.
REPEATER FOR PHONOGRAPHS.
APPLICATION FILED OCT. 10, 1906.

2 SHEETS—SHEET 1.



WITNESSES:

Horace Barnes.

W¹ Gibson.

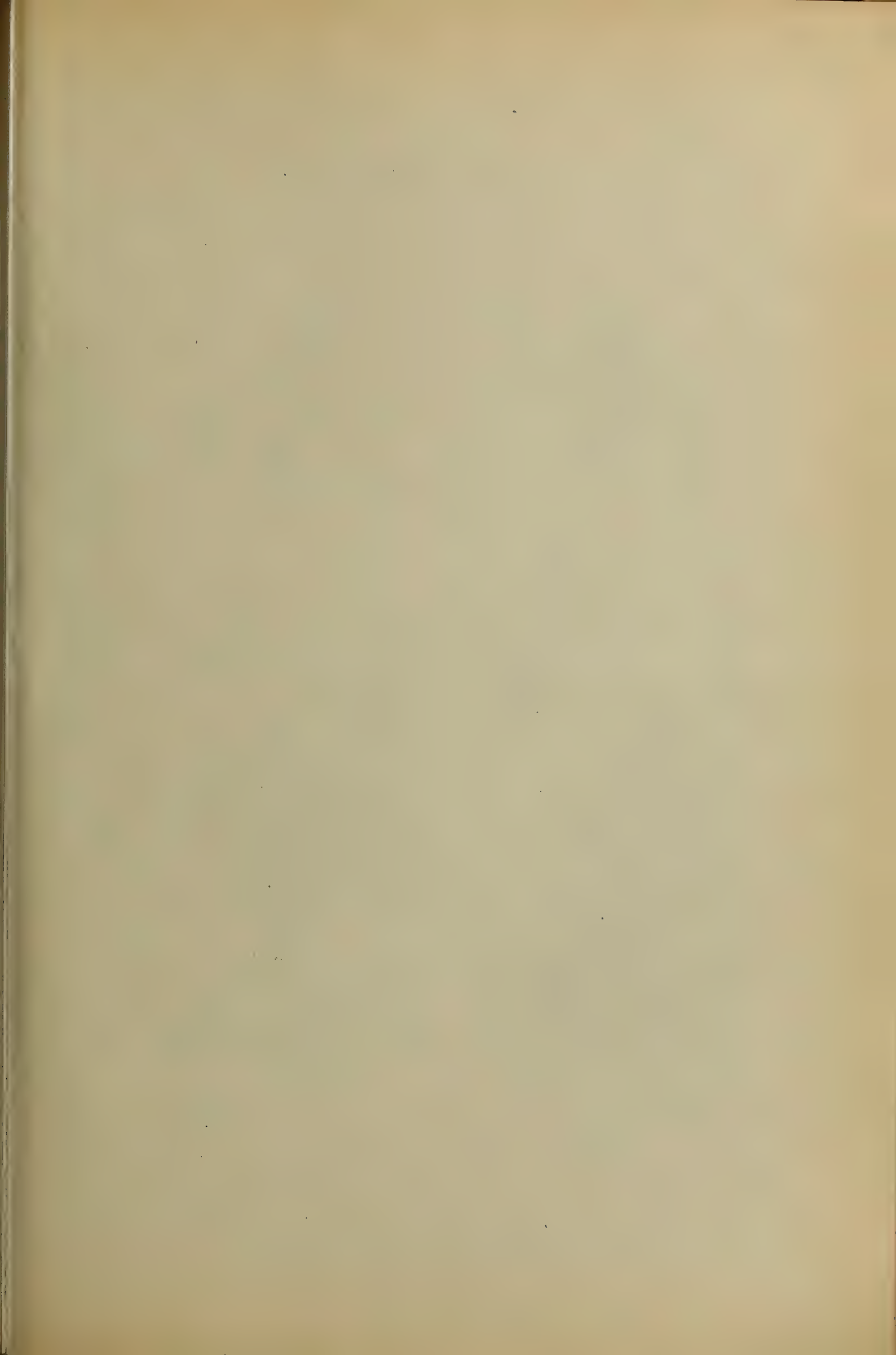
INVENTOR

Sidny B. Yerion

BY

Pierre Barnes
ATTORNEY

ATTORNEY



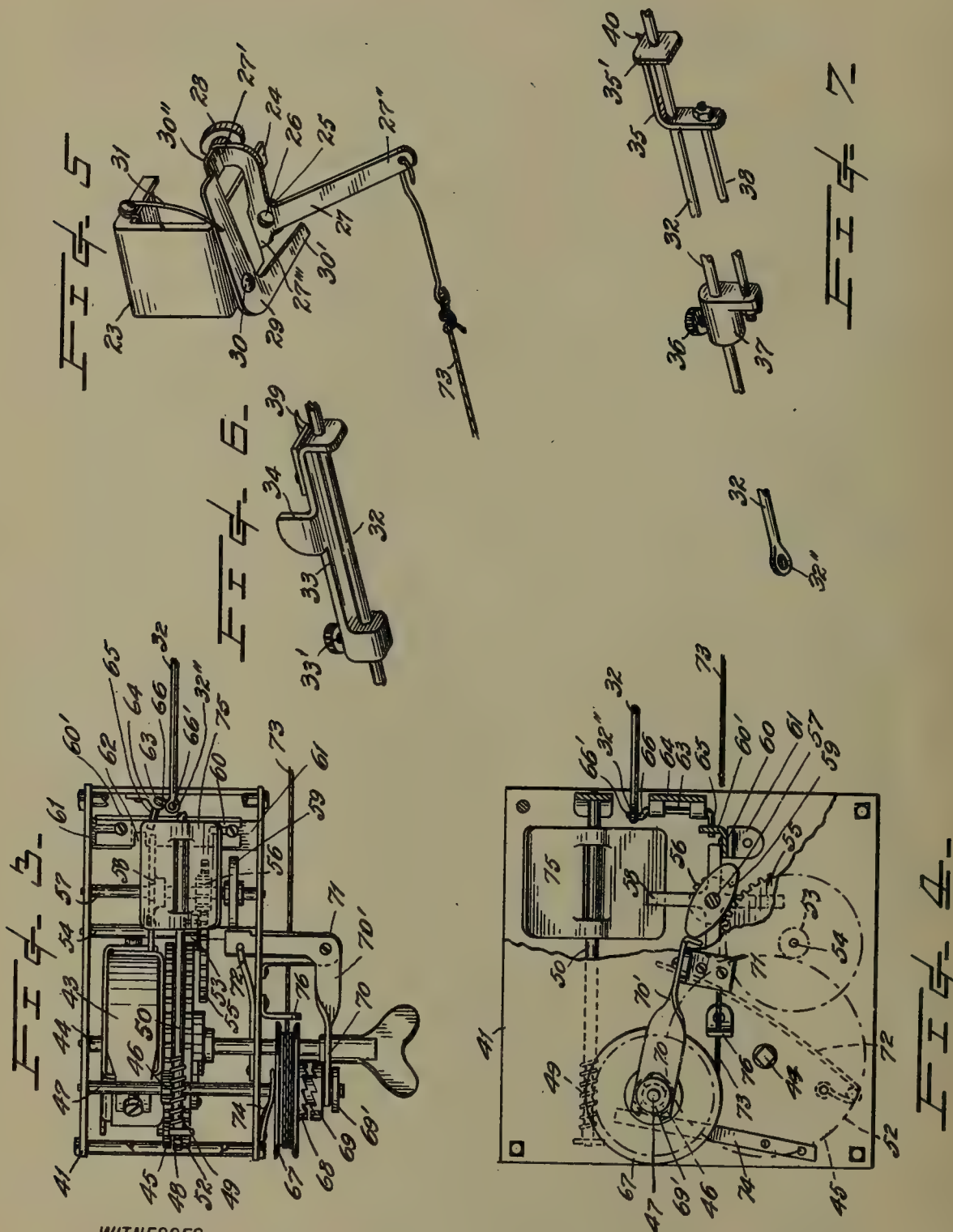
No. 866,552.

PATENTED SEPT. 17, 1907.

S. B. YERION.
REPEATER FOR PHONOGRAPHS.

APPLICATION FILED OCT. 10, 1906.

2 SHEETS—SHEET 2.



WITNESSES:

Horace Barnes.

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UNITED STATES PATENT OFFICE.

SIDNY B. YERION, OF SEATTLE, WASHINGTON.

REPEATER FOR PHONOGRAPHS.

No. 866,552.

Specification of Letters Patent.

Patented Sept. 17, 1907.

Application filed October 10, 1906. Serial No. 338,260.

To all whom it may concern:

Be it known that I, SIDNY B. YERION, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Repeaters for Phonographs, of which the following is a specification.

This invention relates to phonographs and other talking machines; and its object is to provide a mechanically operated attachment to such a machine whereby the music rendered by the reproducer may be automatically repeated either in whole or in part.

With this end in view the invention consists in the novel construction, and combination of devices as will be hereinafter described and claimed.

In the accompanying drawings forming part of this specification, Figure 1 is a front elevation of a phonograph with devices embodying my invention attached; Fig. 2, a fragmentary plan view of the same with the reproducer omitted; Fig. 3, an enlarged plan view of a portion of the apparatus; Fig. 4, a front elevation of the parts shown in Fig. 3 with a part of the frame work broken away; and Figs. 5, 6 and 7, detail perspective views of parts of the invention shown detached.

In said drawings, the reference numeral 10 indicates the phonograph frame which is mounted, as ordinary, upon the box 11 containing the motor for driving the operative parts thereof through the medium of a belt 12 passing about a pulley 13 upon the spindle 14. This spindle is journaled in suitable bearings of the frame, is finely screw-threaded, and carries upon an extension a cylinder 15 for the record 16. The screw serves through a nut 17 and connecting parts 18 to feed the sound reproducer 19, containing the diaphragm and a stylus, so that the latter will follow the helical indentations of the record, and is prevented from unduly bearing upon the record by a block 20 slidable on the straight-edge 21 of the frame 10. All of the aforesaid parts are, or may be, of ordinary construction, found in certain classes of phonographs.

Detachably connected to the block 20, as by a set screw 22, is a casing-like structure 23 provided with a rearwardly protruding finger 24, and a downwardly extending ear 25 whereunto is fulcrumed by screw 26 a bell-crank 27 having a lateral arm 27', a pendent arm 27'', and a lug 27''' disposed oppositely of the first named arm and arranged to contact with the bottom of the casing, to limit the swing of the crank in one direction. The arm 27' carries an anti-friction roller 28 positioned immediately above said straight-edge 21 and adapted when forced by the action of the bell-crank thereagainst to elevate the block 20 and so raise the stylus from the record.

29 is a bell crank fulcrumed by a screw 30 to the under side of the casing with one of its arms, 30', extending rearwardly at the left hand side of the block, while the other arm, 30'', has its outer end pressed normally

against the crank arm 27' through the action of a suitable spring, such as 31. When the block, as above stated, is elevated, then the arm 30'' of the crank 29 is correspondingly raised, and when above the height of the crank-arm 27' is thrust there-above by the force of said spring, and maintains the block in such raised position until the crank 29 is tripped, as presently described.

Adjacent of the straight-edge 21 and extending longitudinally of the frame 10, is a drag-bar 32 which is slidably seated at one end in a support 32', the latter detachably connected to the frame, while the other end is connected with the motion controller of the repeater actuating devices.

Adjustably seated upon the bar 32 and to the left hand side of the record cylinder, is an attachment 33, see Fig. 6, which is secured in predetermined adjusted positions by means of a set screw 33, and has at its front a protruding lug 34 positioned so as to interfere with the crank-arm 30' when the retrograde travel of the reproducer has caused it to be brought to the terminus of its reverse course, as controlled by the positioning of said attachment, and swerving the crank arm 30'' from its engagement with the arm 27' for releasing the block from its poised condition. Another attachment 35 is slidably seated upon said drag bar to the right hand end of the record cylinder, and is secured in adjusted position by a set screw 36 which, for convenience in manipulating, is employed in an auxiliary attachment 37 towards the opposite end of the bar, and these last mentioned attachments are operatively coupled together by a reach-rod 38, as shown in Fig. 1.

The attachment 35 is provided with a forwardly extending ear 35' for the purpose of forming an abutment against which the finger 24 of the shell will strike at the end of the travel to effect the shifting of the bar 32 and cause the operating mechanism to be actuated. Adjustably connected with the attachments 33 and 35, respectively, are pointers 39 and 40 which are used indicating the exact positions at which the attachments are to be located to effect the purposes before explained; for example, the attachment 33 would be set so as to present the pointer 39 at the beginning of the indentations of the record the music of which is intended to be repeated, while the other attachment 35 is set with its pointer 40 at the end of the music.

Referring now to Figs. 1, 3 and 4, showing mechanism for automatically actuating the return movements of the reproducer and raising and lowering the same clear of and upon the record, 41 is a containing case adapted to be secured to the box 11 in any suitable manner, as by a clip 42 introduced between the cover 11' and the adjacent end 11''. Within this casing is a clock-work mechanism consisting of a train of wheels driven from a power spring 43 upon a winding arbor 44, and imparting motion through the gear wheels 45

and 46 to an arbor 47 carrying a worm wheel 48 engaging a worm pinion 49 upon a longitudinal arbor 50, whereupon is a speed retarding fan 75. The arbor 47 likewise rotates, through wheels 52 and 53, an arbor 54, which in turn is geared by wheels 55 and 56 with an arbor 57, the latter having fixedly mounted thereon an escapement 58 and a cam 59. A plate 60 reciprocally seated upon supports, such as 61, within the casing, is provided with a notch 62, and is shifted from side to side by means of the aforesaid drag-bar 32 to permit of the arms of the escapement successively passing through the slot, and its motion intermittently arrested by the arms of the escapement being individually caught by the plate upon either side of the notch.

An advantageous connection between the plate 60 and the drag bar is the employment of a vertically disposed rod 63 carried in bearings 64, and provided with bent ends 65 and 66 which are respectively engaged with the plate by passing through a notched flange 60', and with the bar by forming a crank-pin extremity 66' to receive an eye 32'' of the bar. The arbor 47 has mounted thereon a normally loose spool 67 which upon occasion is coupled therewith by clutch elements 68 and 69 respectively formed on the spool and a peripherally grooved hub 69' splined to the arbor. The hub of the clutch member 69 is connected to the forked arm 70 of a bell-crank 70' which is fulcrumed to a bracket 71 of the casing, and has its other arm engaged with the perimeter of said cam 59 which, being elliptical, will in rotating alternately thrust the clutch element 69 out of mesh with the other element against the action of a spring 72, and then allow the latter to assert itself to again couple such elements. 73 is a flexible line having one of its ends affixed to the spool and passing through an aperture of a fair-leader 76 has its other end connected with the pendent arm 27'' of the bell-crank 27, whereby, as the line is wound about the spool, it serves to tilt the crank arm to elevate the block 20 from the straight edge 21 and by a continued action retracts the reproducer. 74 is a brake-spring pressing frictionally against said spool to prevent the latter upon being released by the clutch from turning with too great a velocity.

The operation of the invention is as follows: The record being placed upon the cylinder 15 of the phonograph, the attachments 33 and 35 would be secured to the bar 32 so that the respective pointers 39 and 40 would be opposite the ends of the record markings. The phonograph is now started and the reproducer brought into juxtaposition with the attachment 33 by pushing it along toward the left by finger pressure exerted against the crank-arm 27'', or by moving the bar 32 to the right to actuate the repeating mechanism. In either case the reproducer is raised sufficiently to permit the spring-pressed crank-arm 30'' to be engaged with the arm 27' and holds the reproducer in such elevated condition until disengaged by the impinging of the arm 30' against abutment 34, with the resultant lowering, as before explained, of the feed nut 17 and the reproducer into operative engagement with the screw spindle and with its stylus upon the record. The striking of the abutment also forces the drag-bar to be moved to shift the notch 62 of plate 60 across the plane of the escapement wheel arms, meanwhile allowing this wheel to make a partial rotation, and the cam 59 brought to pre-

sent one of the ends of its major diameter against the crank 70' to disengage the clutch elements, thereby causing the spool 67 to be loose and offer no resistance to the unwinding of the line 73 as the reproducer is progressively moved by the phonograph motor in the direction indicated by arrow in Fig. 1.

When the reproducer has reached the end of its travel, as controlled by the adjustment of the attachment 35, the finger 24 will strike the portion 35' of the latter to cause the movement of the rod 32 and tripping of the plate 60 to move the nut 62 in position opposite the paths of the arms 58 of the escapement and thus release the latter and the cam 59 and permit the clutch to be coupled and cause the line 73 to be wound about the spool, which raises the reproducer and drags it into contact with the attachment 33, thus effecting the purpose of the invention by repeating the music. More specifically, when the drag-bar is moved toward the right by the interference of the attachment 35, as above explained, the plate 60 is shifted to permit the escapement wheel 58 to make a quarter turn, and the cam being correspondingly moved brings an end of its minor diameter to oppose the crank 70', and allows the spring 72 to assert itself to couple the clutch elements and fix the spool to its arbor, which being now active winds in the line to accomplish the reverse movement of the reproducer. During this step in the operation, one of the escapement wheel arms 58' is directed toward the fan and, being shorter than either of the others does not protrude within the path of travel of the fan-wings, so that the latter being unrestrained allows the clock-work to operate and coincidentally regulate the speed thereof. The clock-work continues to operate until the plate has again been shifted to afford a quarter turn to the wheel 58 and bring one of the longer arms thereof into the path of the fan, thus stopping the action of the clock-work and at the same time disengaging the clutch, which occurs as the reproducer is lowered.

With the present invention, the operation of the return of the reproducer to make repetition of the music is accomplished by an independent motor, is rapid in action, and works in an efficient manner and without any apparent jar or shock.

Having described my invention, what I claim, is—

1. In a device of the class described a reproducer, a record, a spring actuated mandrel having a winding drum, a trip mechanism carried by said reproducer, a winding cable between said trip mechanism and drum, a trip mechanism adapted to hold said drum out of action, spaced abutments in the path of said reproducer, and connecting means between said abutments and the trip mechanism of said drum.

2. In a device of the class described a reproducer, a record, a supporting frame, a spring actuated mandrel carried by said frame, a winding drum operated by said mandrel, escapement device connected to said mandrel, a stop movable into the path of said escapement, means operative by said escapement for holding said winding drum out of action, a trip mechanism carried by said reproducer, a winding cable between said trip mechanism and drum, spaced abutments in the path of said reproducer, and connecting means between said abutments and said escapement stop.

3. In a device of the class described a reproducer, a record, a supporting frame, a spring actuated mandrel carried by said frame, a winding drum operated by said mandrel, escapement device connected to said mandrel and including a fan device and a wheel formed with a plurality of spaced radiating arms movable into the path of

said fan, a plate movable transversely of the path of said radiating arms and provided with a notch adapted to permit the arms to pass when the plate is disposed in one position, means operative by said escapement for holding said winding drum out of action, a trip mechanism carried by said reproducer, a winding cable between said trip mechanism and drum, spaced abutments in the path of said reproducer, and connecting means between said abutments and said recessed plate and adapted to actuate the same when the reproducer engages the abutments.

4. In a device of the class described a record, a repeating mechanism, a reproducer, a casing connected to said reproducer and provided with a laterally extending stop, a movable rod, abutments spaced apart upon said rod, a trip mechanism carried by said shell, a winding drum carried by said repeating mechanism, a cable connected between said drum and the trip mechanism of said reproducer, connecting means between said rod and repeating mechanism, means whereby said rod is operated by the contact of said shell with one of said abutments, and means whereby the trip mechanism of said shell is operated by the contact thereof of the other said abutment and the winding drum set into operation.

5. In a device of the class described a reproducer, a record, a supporting frame, a spring actuated mandrel carried by said frame, a winding drum having a clutch member and operated by said mandrel, escapement device

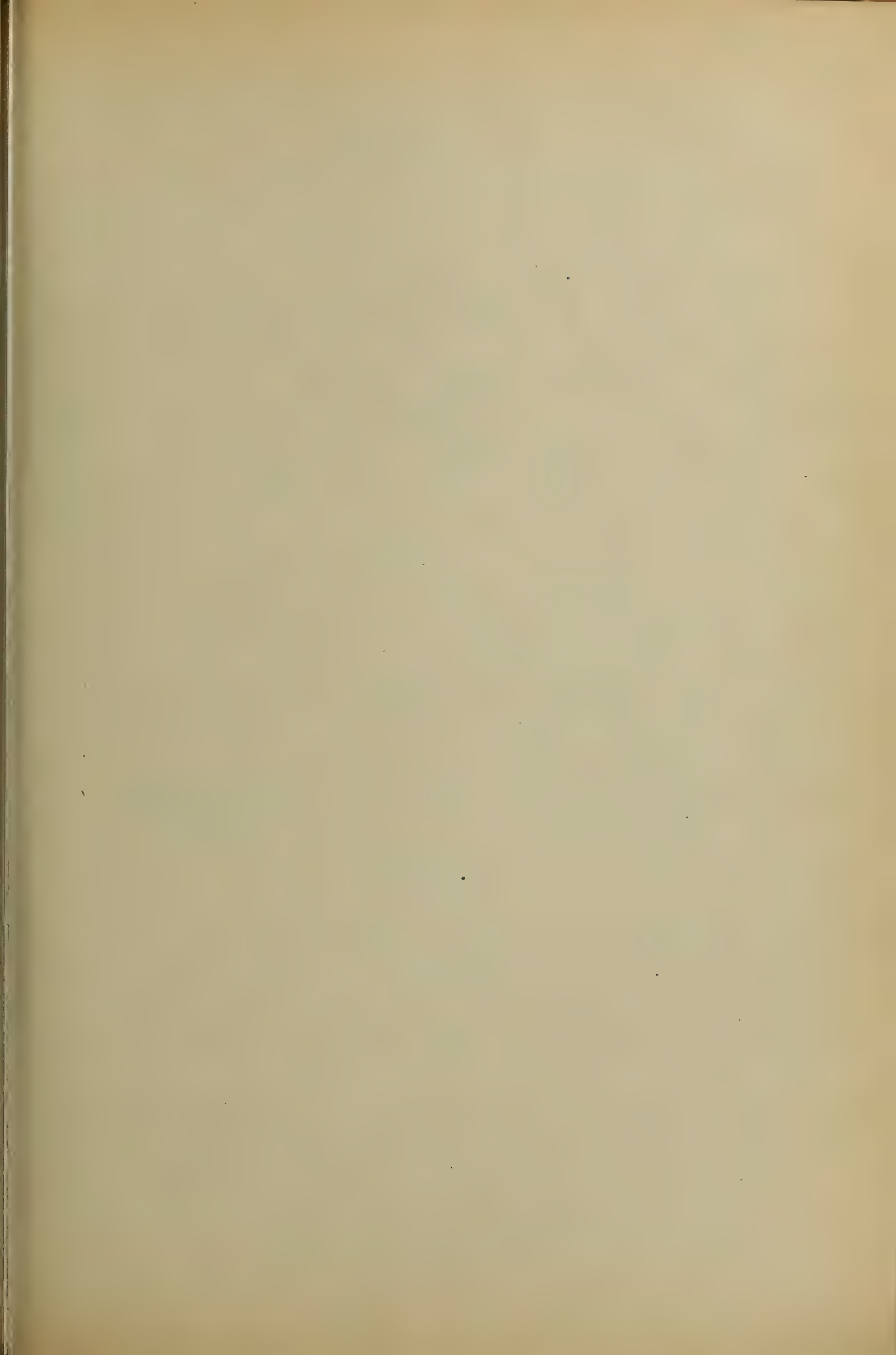
connected operatively with said mandrel and including a fan device and a mandrel carrying a cam and a wheel having a plurality of radiating arms adapted to move intermittently into the path of said fan device, a clutch member movably disposed relative to the clutch member of said winding drum, a lever between said movable clutch member and said cam and adapted to be operated by the movement of the same, a plate movable transversely of the path of the radiating arms of said escapement wheel and provided with a notch adapted to permit said arms to pass when the plate is disposed in one position, a shell connected to said reproducer, a bell-crank swinging vertically from said shell, a bell-crank swinging horizontally from said shell with one arm movable into the path of one of the arms of said vertically swinging bell-crank, a movable rod carrying abutments spaced apart and disposed in the path of the reproducer, connecting means between said rod and said movable recessed plate, and a winding cable between said winding drum and the free end of said vertical bell-crank lever.

In testimony whereof I affix my signature in presence of two witnesses.

SIDNY B. YERION.

Witnesses :

PIERRE BARNES,
JOSEPH RISSE.



C. L. MEYERS.
NEEDLE FOR TALKING MACHINES.
APPLICATION FILED JULY 19, 1907.

Fig. 1.

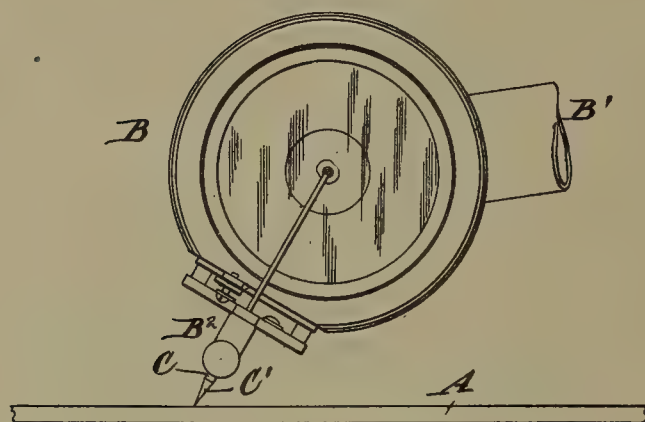


Fig. 2.

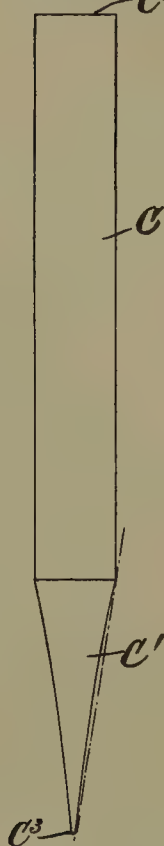


Fig. 4.

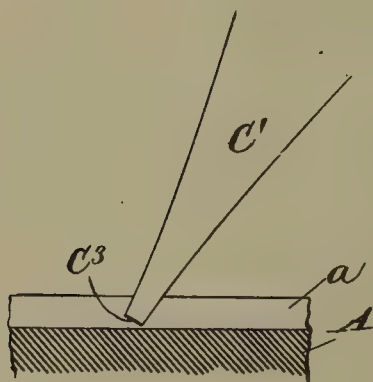


Fig. 5.

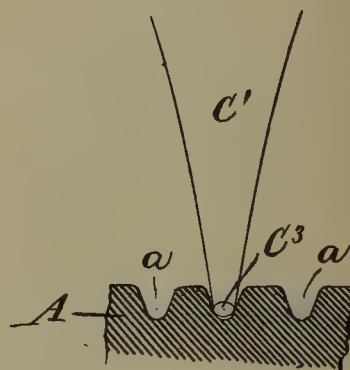


Fig. 3.



Witnesses:
L. M. Lewis
H. J. Petersen.

Inventor:
Charles L. Meyers,
by his attorney
Charles R. Searle

UNITED STATES PATENT OFFICE.

CHARLES L. MEYERS, OF JERSEY CITY, NEW JERSEY.

NEEDLE FOR TALKING-MACHINES.

No. 866,950.

Specification of Letters Patent.

Patented Sept. 24, 1907.

Application filed July 19, 1907. Serial No. 384,535.

To all whom it may concern:

Be it known that I, CHARLES L. MEYERS, a citizen of the United States, residing in Jersey City, in the county of Hudson and State of New Jersey, have invented a certain new and useful Improvement in Needles for Talking-Machines, of which the following is a specification.

The invention relates to needles used in instruments of the talking machine class for engaging the groove in the record and transmitting sound vibrations induced thereby to the diaphragm of the reproducer, and the object of the invention is to provide a needle which in coöperation with the record groove and sound-box, will reproduce the record clearly and distinctly, with marked lessening of "scratch" and increased fidelity to true tonal qualities.

The invention consists in certain details of form, size, and proportions of parts, by which the above objects are attained, to be hereinafter described.

The accompanying drawings form a part of this specification and show what is considered to be the best form of the invention.

Figure 1 is an elevation of a portion of a record and sound-box showing the improved needle in place. Fig. 2 is an elevation or side view of the needle alone, on a greatly magnified scale. Fig. 3 is a corresponding end view. Fig. 4 is a section through a portion of a record, on a still larger scale, showing the point of the needle in elevation, in a record groove. The line of section being the center line of such groove. Fig. 5 is a corresponding section and elevation. The line of section being transverse to the grooves.

Similar letters of reference indicate the same parts in all the figures.

By careful research and experiment I have demonstrated that certain sizes, proportions, and forms, together with material of the proper character, are necessary in the construction of a needle capable of producing the desired effects in service. The present invention is the result of such investigation and is based on the discoveries thus made.

A is a record which may be understood to be a standard disk record made by the Victor Talking Machine Company, and having the usual volute groove *a* therein, and B a standard sound-box having a tube *B*¹ leading therefrom to a horn, not shown, and a socket *B*² for a needle.

The improved needle has a cylindrical body *C* and a concavely tapered point *C*¹; the upper end of the body and the lower extremity of the point terminate in plane faces, marked *C*², *C*³ respectively, parallel with each other and at a right angle to the axial line of the needle.

My experiments indicate that the body *C* of the needle should be sixtyfive one-thousandths (65/1000) of an inch in diameter; the diameter of the point-face

*C*³, two one-thousandths (2/1000) of an inch; the maximum concavity of the curve forming the tapered point should be four one-thousandths (4/1000) of an inch; the length of the point two hundred and thirty-five one-thousandths (235/1000) of an inch; the length of the cylindrical body four hundred and fifty one-thousandths (450/1000) of an inch, and the total length six hundred and eightyfive one-thousandths (685/1000).

I have found the best material to be highly carbonized steel of tough fiber, hardened to as great a degree as may be without becoming brittle.

It is believed the reason for the increased efficiency of the improved needle is largely due to the form of the point and the position it occupies in the groove. Its concavity insures contact on the sides of the groove at two points only, and the flat face at the termination of the point lies always above and out of contact with the bottom of the groove, thus the area of contact is extremely limited resulting in greatly lessening the objectionable "scratch" ordinarily very noticeable. The form of the point permits it to penetrate to sufficient depth in the groove to insure perfect engagement therewith, and the attenuation of the point permits the latter to follow accurately slight sinuosities in the lateral bends or convolutions of the groove, by which the sound vibrations are reproduced, thus avoiding "slurring". The flat upper face *C*² tends to increase the area of contact with the socket *B*² in which the needle is held, and aids thereby in transmitting the vibrations.

Whether the above theoretical reasoning be correct or not, the fact remains that a needle formed as shown and described produces results far in advance of those produced by any other needle known to me. The improvement is especially marked in the reproduction of instrumental music and the tones of the singing or speaking voice. The clearness of detail, accentuation and the tone qualities of the human voice are distinguishable to the faintest inflection and intonation. In band music the broad tones of the bass horns are reproduced with softness and true tonal value, preserving all the effect of their great sound volumes. On the middle register and high notes there is a clearness of tone and distinctness of sound identical with actual playing.

The improved needle by reason of its form and peculiar engagement with the groove, wears but little and apparently reproduces the last notes of the record as clearly and distinctly as the first, and also acts less destructively on the record, thus prolonging its term of usefulness.

I claim:—

1. The talking machine needle described, comprising a body and a concavely tapered point.

2. The talking machine needle described, comprising a cylindrical body and a concavely tapered point.

3. The talking machine needle described, comprising a body, a concavely tapered point, and a plane face forming the termination of said point.

4. The talking machine needle described, comprising a cylindrical body, a concavely tapered point, a plane face at the end of said body, and a plane face forming the termination of said point, said faces arranged parallel to each other and at a right angle to the axial line of said needle.

5. In a talking machine needle, a cylindrical body having a diameter of $\frac{65}{1000}$ of an inch, a concavely tapered point $\frac{235}{1000}$ of an inch in length and terminating in a

plane face $\frac{2}{1000}$ of an inch in diameter and arranged at a right angle to the axial line of said needle, the concavity of said point being $\frac{4}{1000}$ of an inch at the greatest depth of the curve.

6. The talking machine needle described, comprising a cylindrical body, a concavely tapered point, and a plane face forming the termination of the latter, in combination with a sound-box and record of a talking machine.

In testimony that I claim the invention above set forth I affix my signature, in presence of two witnesses.

CHARLES L. MEYERS.

Witnesses:

LEWIS R. MEYERS,

CHARLES R. SEARLE.

J. H. ELFERING.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED NOV. 12, 1904.

Fig. 1.

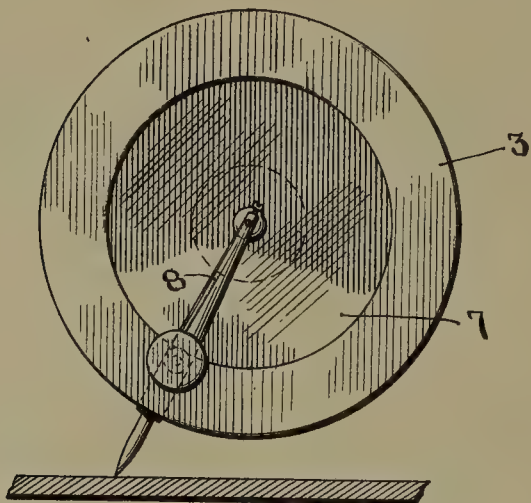


Fig. 2.

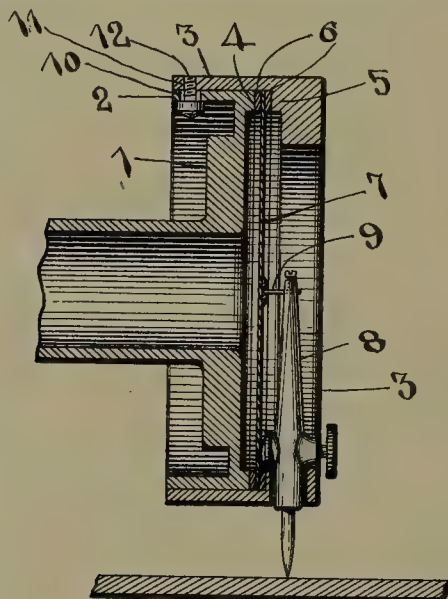
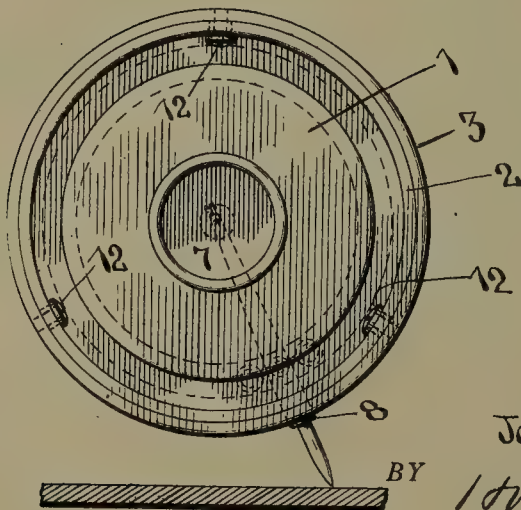


Fig. 3.



WITNESSES:
F. G. Hartman
Edw. W. Vaile Jr.

INVENTOR
John H. Elfering
BY *Wm. T. Kelly*
ATTORNEY.

UNITED STATES PATENT OFFICE.

JOHN H. ELFERING, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX FOR TALKING-MACHINES.

No. 867,259.

Specification of Letters Patent.

Patented Oct. 1, 1907.

Application filed November 12, 1904. Serial No. 232,392.

To all whom it may concern:

Be it known that I, JOHN H. ELFERING, a citizen of the United States, and a resident of the city of Camden, State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a full, clear, and complete disclosure.

The object of my invention is to provide such a construction in sound boxes, that the parts of the casing thereof may be easily adjusted to give the correct pressure upon the parts for holding the diaphragm in position.

Heretofore, in the construction of sound boxes, it has been customary in some instances to force the parts of the casing of the sound box together, so that the same are retained relatively in position by friction. The difficulty has been experienced in this manner of assembling the parts of a sound box arising from the fact that the exact amount of force to produce the requisite pressure upon the parts for holding the diaphragm, cannot be accurately determined, thereby causing considerable variation in the efficiency and quality of reproduction in different sound boxes.

My invention is designed to efficiently overcome these objections.

For a full, clear and exact description of one embodiment of my invention, reference may be had to the following specification, and to the accompanying drawing forming a part thereof, in which

Figure 1 is an end elevation of a sound box embodying my improvements; Fig. 2 is a central, longitudinal, sectional view thereof, and Fig. 3 is a rear elevation thereof.

Referring to the drawing, the numeral 1 indicates the inner portion of the sound box casing, which is preferably provided with an external cylindrical flange 2. The outer cylindrical portion 3 of the sound box casing is adapted to fit over said cylindrical flange 2, and is slidably retained thereon. The interior of portions 1 and 3 of the sound box casing are provided with low flanges 4 and 5, upon which are seated the usual gaskets 6, between which is retained the diaphragm 7. The stylus bar 8 is pivotally mounted upon the portion 3 of the sound box casing in the usual, or any suitable manner, and is connected with the diaphragm by the usual connection or wire 9. The cylindrical flange 2 is provided with openings 10, and the cylindrical portion 3 with screw-threaded openings 11, which are smaller than the openings 10 in the cylindrical flange 2. Machine screws 12 pass loosely through the openings 10 and enter the screw-threaded openings 11 in the cylindrical portion 3. It will be

noted that the openings 10 are greater in diameter than the diameter of the screws 12, thereby allowing a slight range for adjustment of the portions 1 and 3 of the casing relatively.

In assembling the parts of the sound box, the stylus bar, diaphragm, and gaskets are placed in position within the cylindrical casing 3, the portion 1 of the casing is inserted within the cylindrical portion 3, so that its flange 4 abuts against the adjacent gasket 6. The screws are then inserted in the openings as above described, and after the requisite pressure has been given to the parts of the sound box casing to clamp the diaphragm in position, the screws are set tightly in position, thereby holding the parts of the casings together with the correct pressure upon the gaskets. In this manner each sound box is made substantially like every other sound box and the pressure upon the diaphragm may be relied upon to be the same in each instance without resorting to experiments to determine how firmly or how loosely the diaphragm is held in position.

I have thus produced a decided advance in the facility ease, accuracy, and speed in which sound boxes may be manufactured, in addition to producing the greater reliability and uniformity in the finished article.

Having thus described my invention, it will be obvious that certain changes may be made in the form, arrangement, and proportion of parts, without departing from the spirit and scope of my invention, but

What I claim and desire to protect by Letters Patent of the United States, is:—

1. In a sound box for talking machines, the combination with the diaphragm thereof, of a casing for said diaphragm composed of two relatively longitudinally slidable parts, and means passing through both parts inserted from the inside of the inner member for retaining said parts adjustably in position.

2. In a sound box for talking machines, the combination with the diaphragm thereof, of a casing for said diaphragm comprising two telescoping parts, and means passing through both parts inserted from the inside of the inner member for holding said parts adjustably in their relative positions.

3. In a sound box for talking machines, the combination with the diaphragm thereof, of a casing for said diaphragm comprising two longitudinally slidable telescoping parts, and means passing through both parts inserted from the inside of the inner member for holding said parts adjustably in their relative positions.

4. In a sound box for talking machines, the combination with the diaphragm thereof, of a casing for said diaphragm comprising two longitudinally slidable telescoping parts, the outer one of said parts having screw-threaded openings therein, the inner one of said parts having openings therein slightly larger than said screw-

threaded openings, and screws passing from the inner member through said openings for retaining the parts of said casing adjustably in their relative positions.

5 In a sound box for sound recording or reproducing machines, the combination with the diaphragm thereof, of a casing comprising a recessed inner member and an outer telescoping member, the said inner member having substantially its entire outer surface concealed within said outer member and means operated from within the

recess of said inner member, passing through both mem- 10
bers for adjustably securing said parts together.

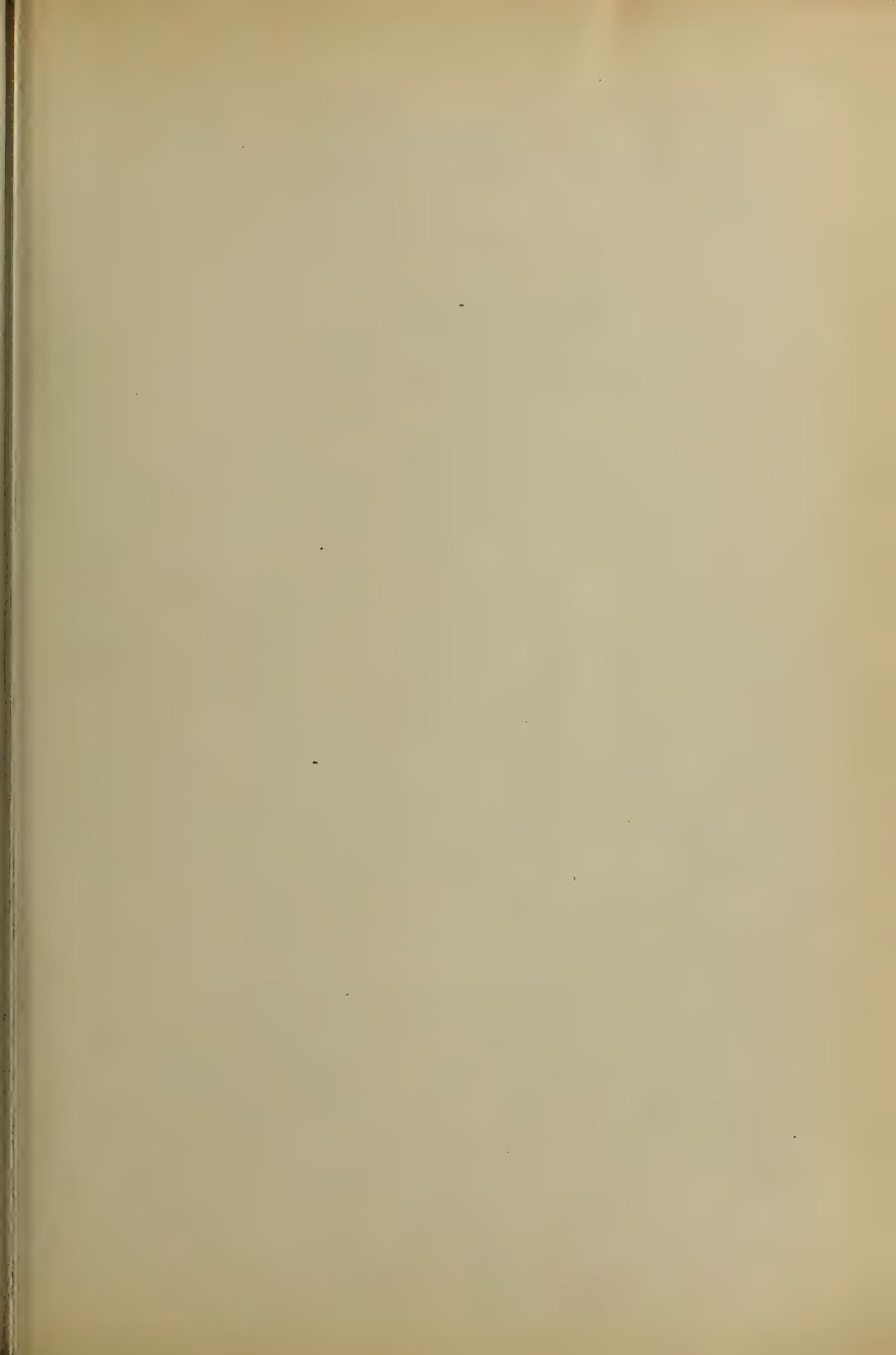
In witness whereof I have hereunto set my hand this
eleventh day of November, A. D., 1904.

JOHN H. ELFERING.

Witnesses:

EDW. W. VAILL, Jr.,

JOHN F. GRADY.

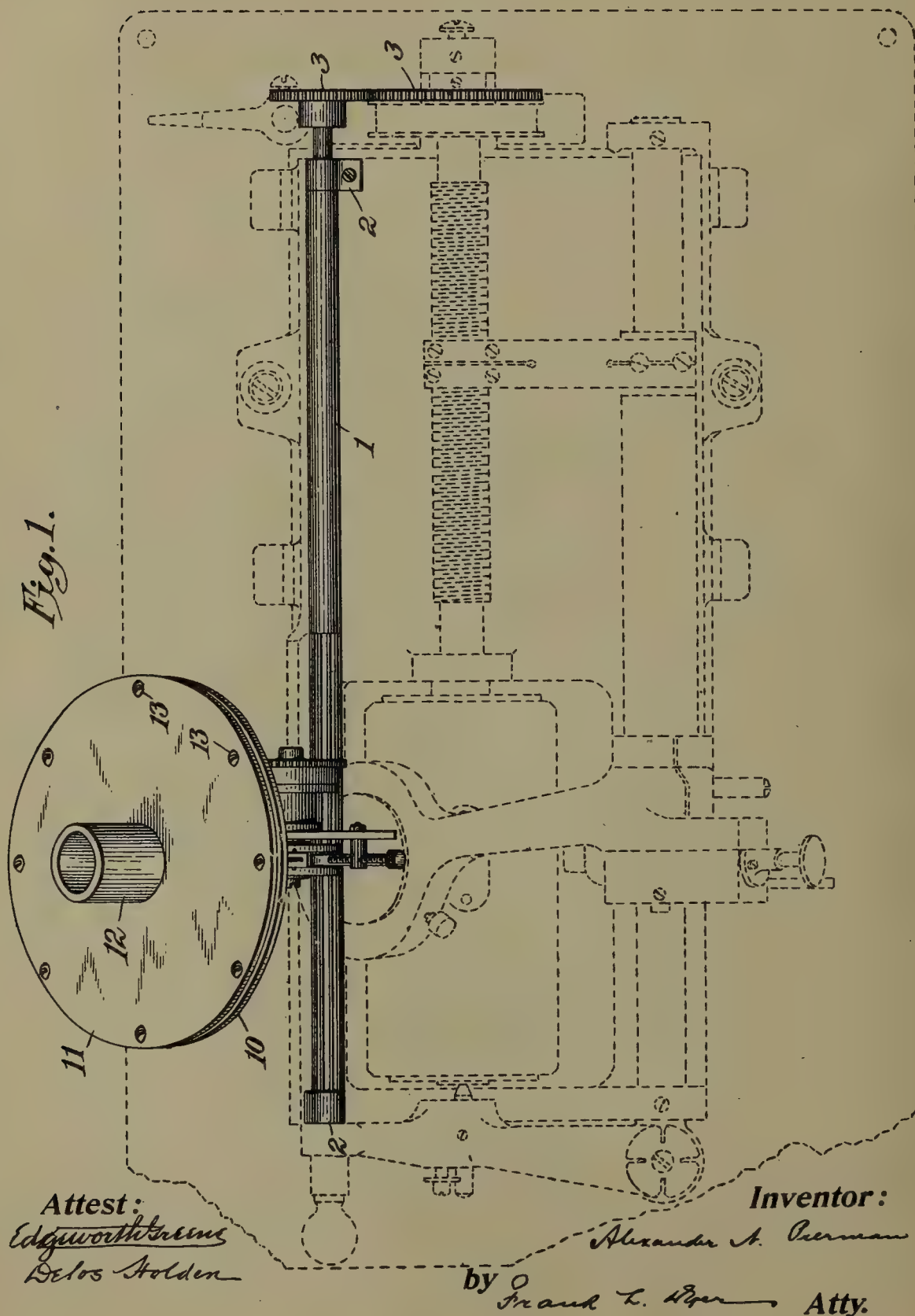


A. N. PIERMAN.

FRICITION REPRODUCING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED MAR. 13, 1905.

6 SHEETS—SHEET 1.



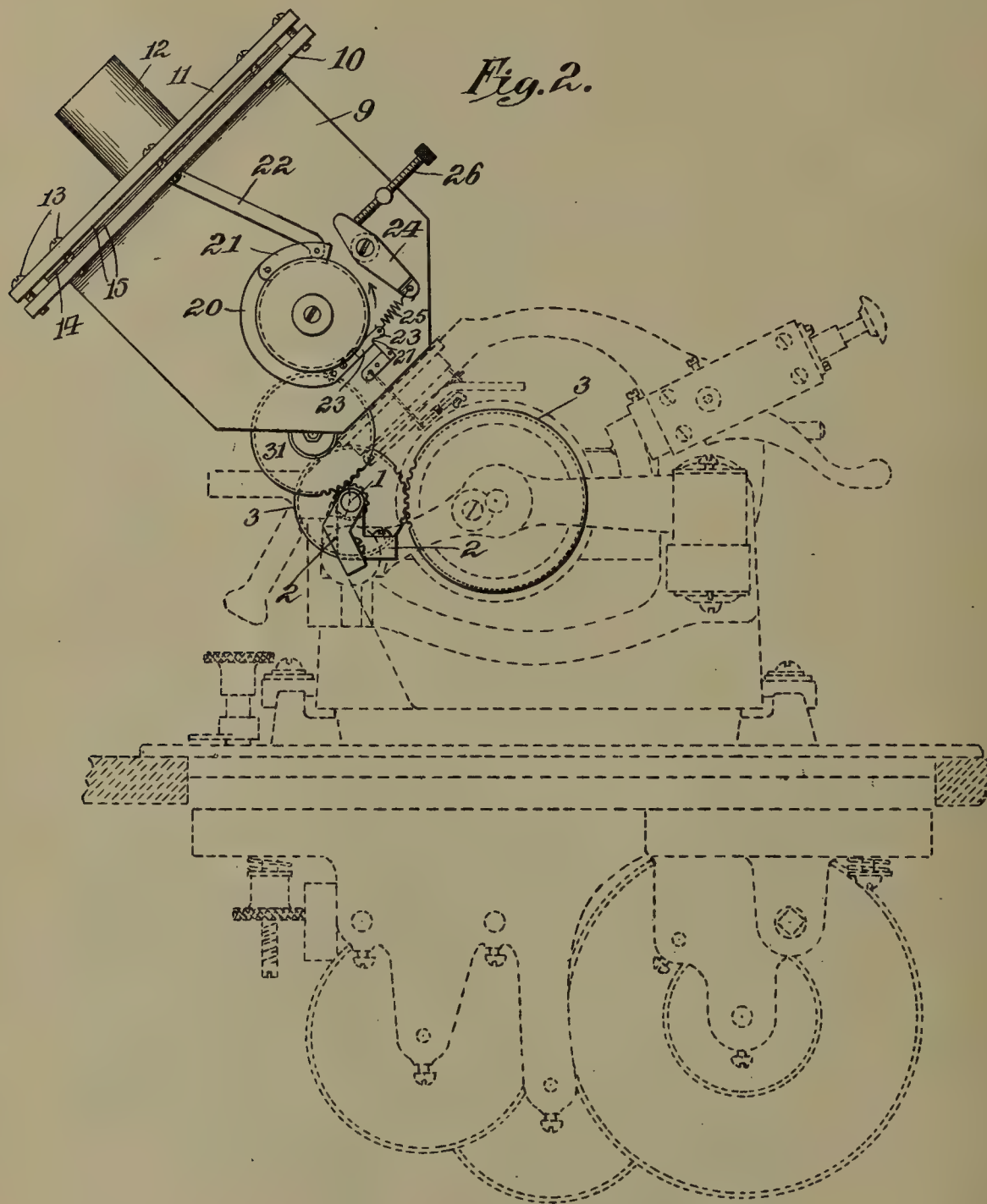


A. N. PIERMAN.

FRICITION REPRODUCING ATTACHMENT FOR PHONOGRAPHS.

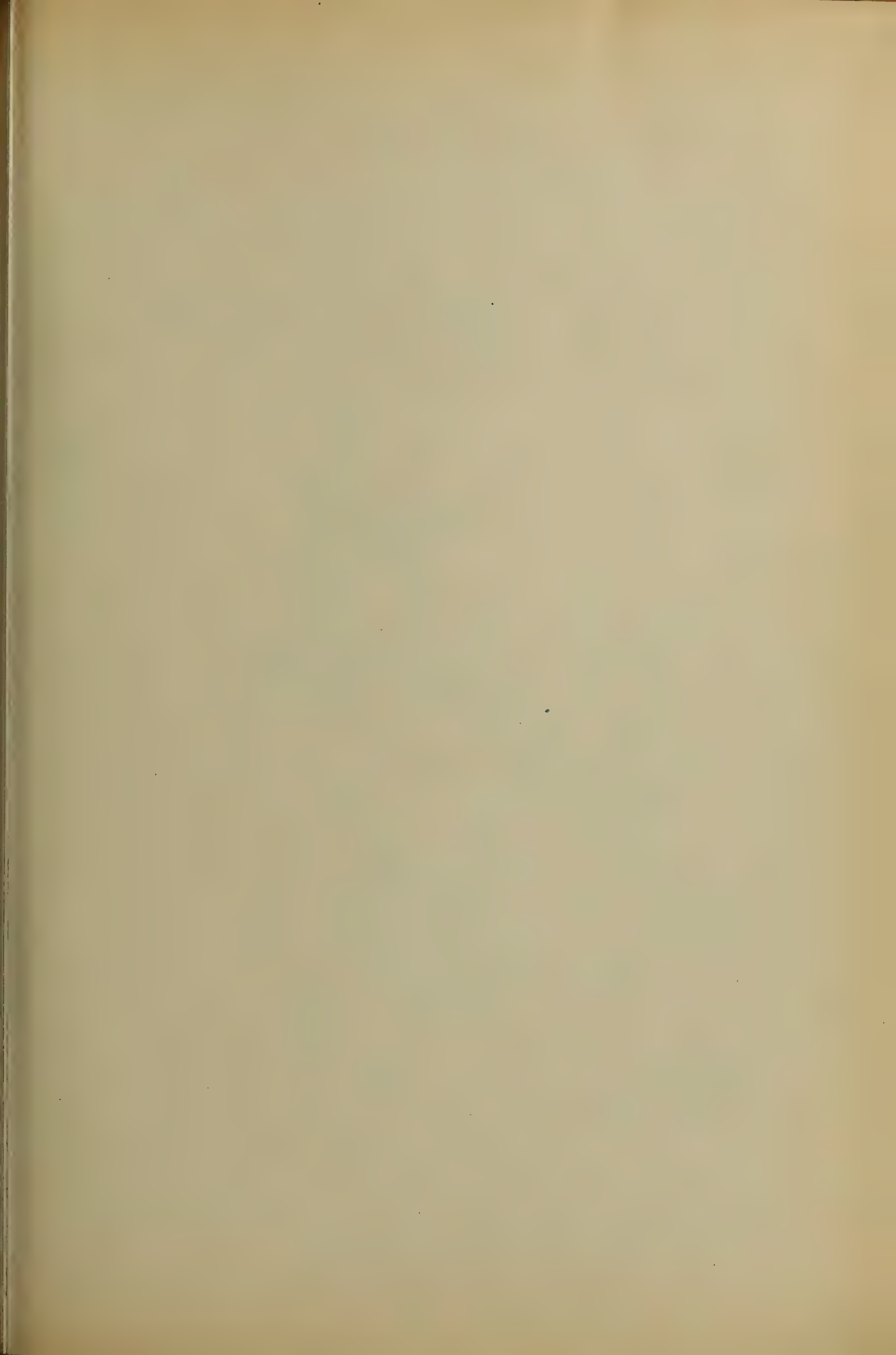
APPLICATION FILED MAR. 13, 1905.

6 SHEETS—SHEET 2.



Attest:
Edgeworth
 Delos Holden

Inventor:
 Alexander A. Pierman
 by *Frank T. [Signature]* Atty.



A. N. PIERMAN.

FRICTION REPRODUCING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED MAR. 13, 1905.

6 SHEETS—SHEET 3.

Fig. 3.

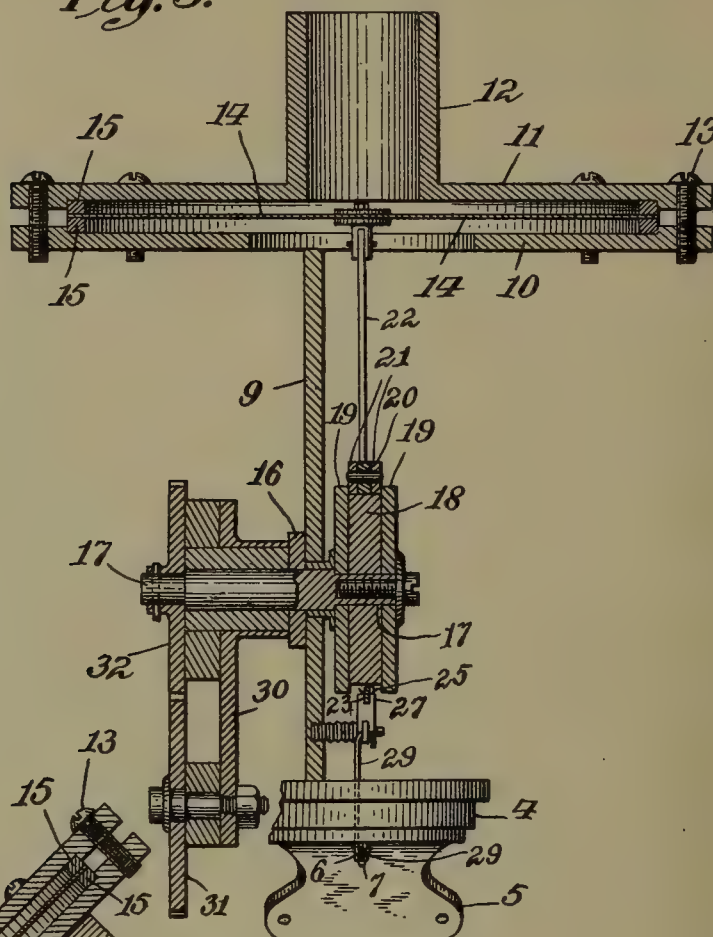
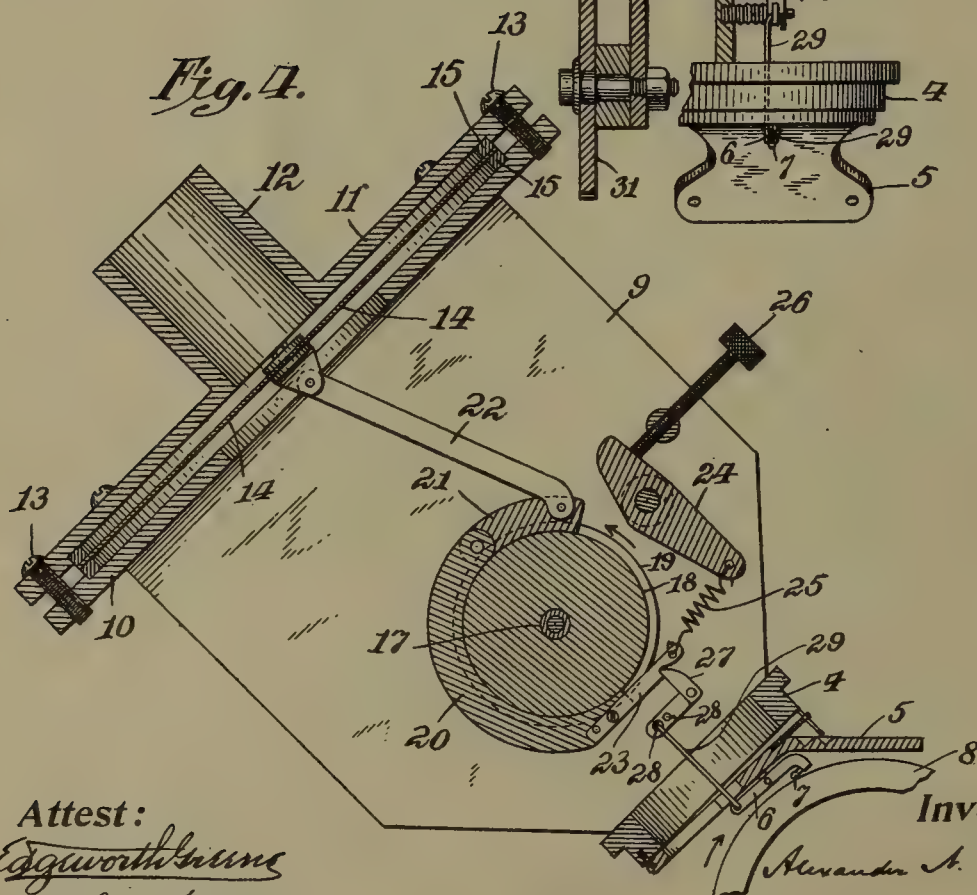


Fig. 4.



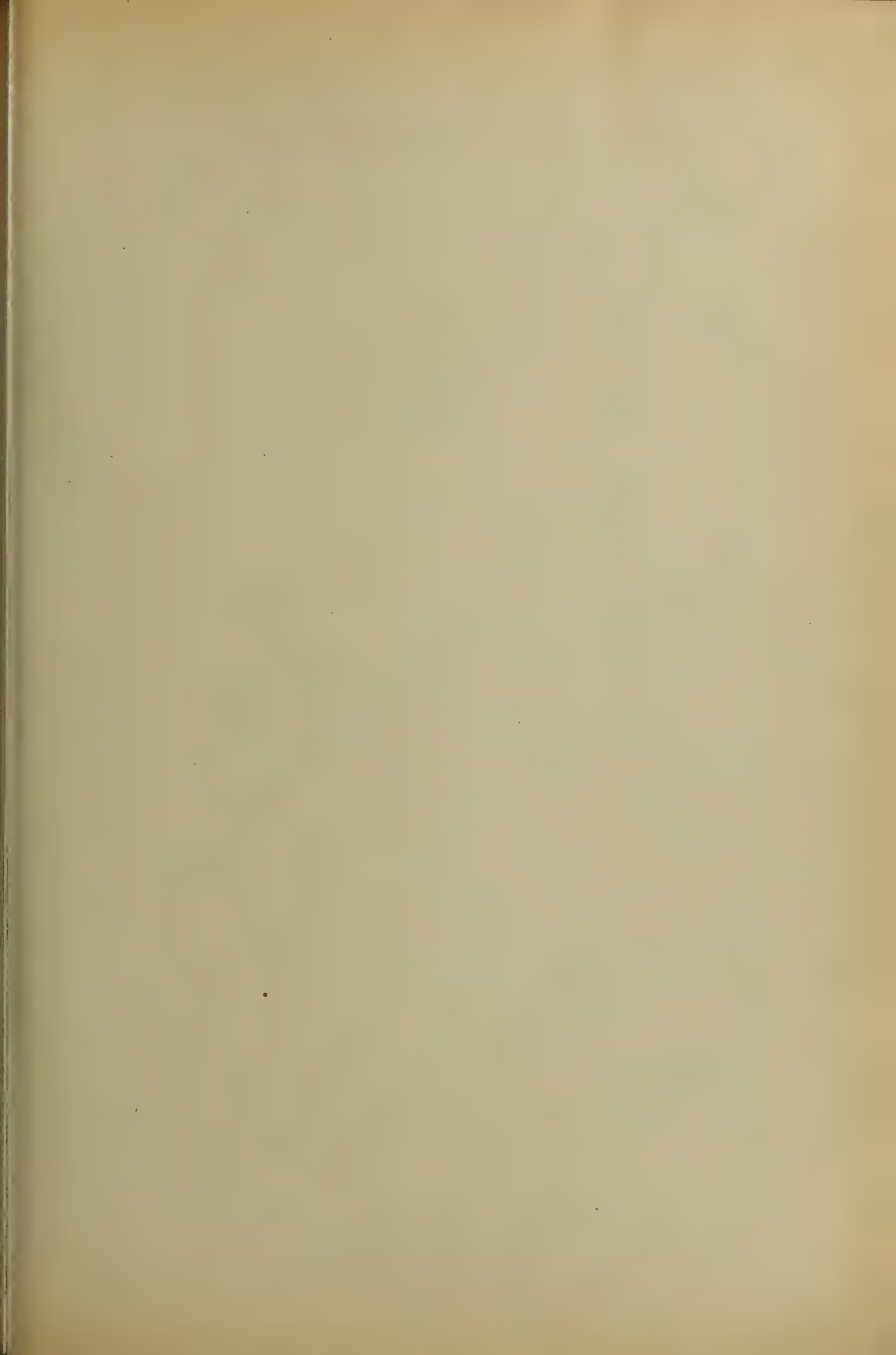
Attest:

Edgworths
Delos Holden

Inventor:

Alexander A. Pierman

by *Frank L. Hyer* Atty.



A. N. PIERMAN.

FRICION REPRODUCING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED MAR. 13, 1905.

6 SHEETS—SHEET 4.

Fig. 5.

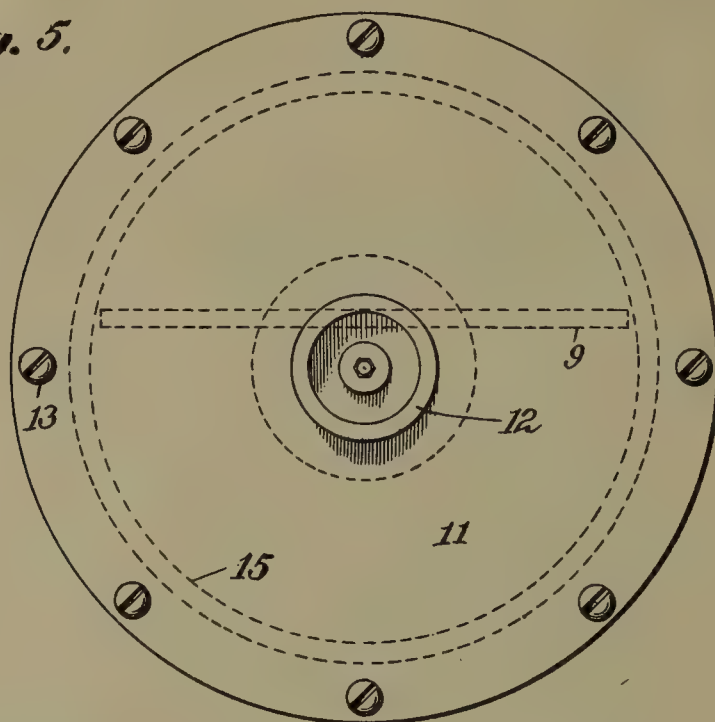
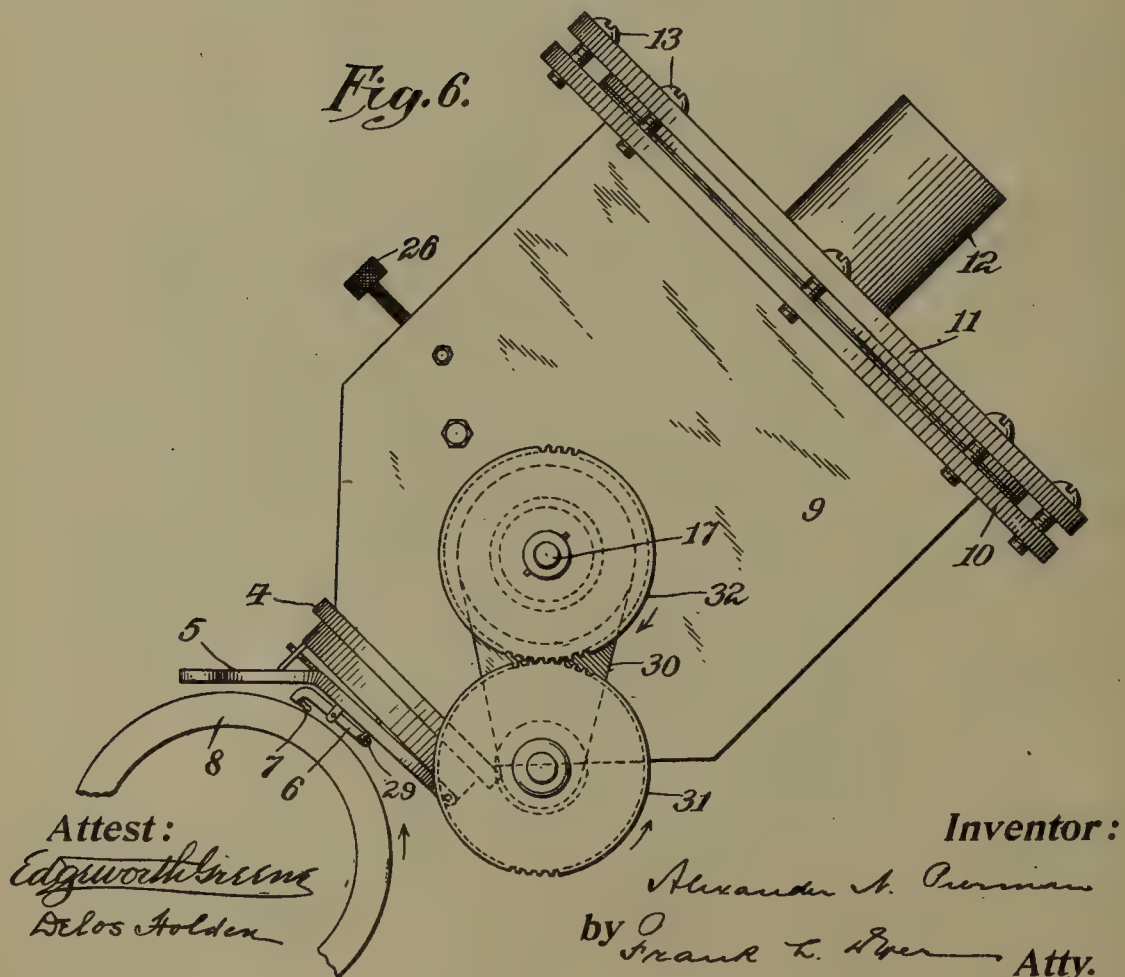
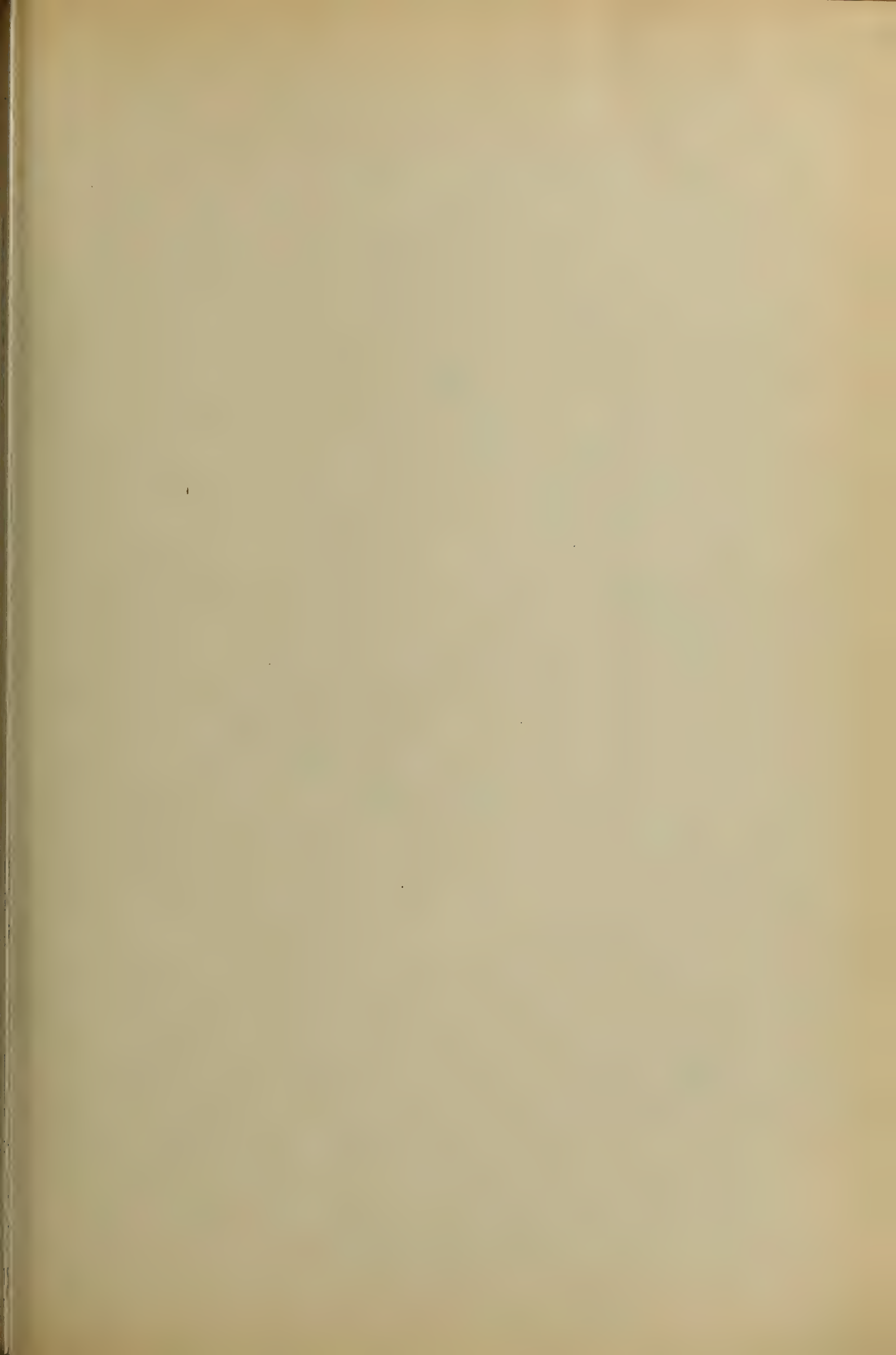


Fig. 6.





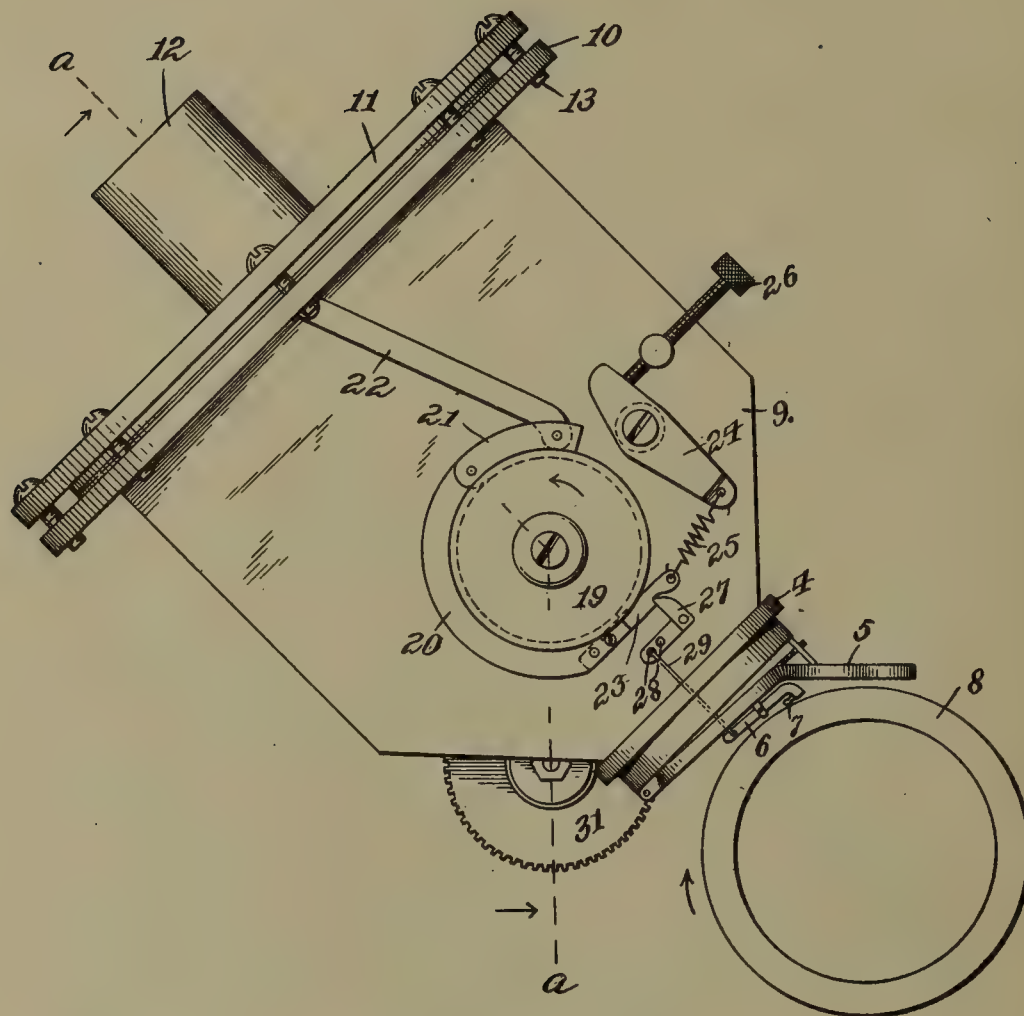
A. N. PIERMAN.

FRICTION REPRODUCING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED MAR. 13, 1906.

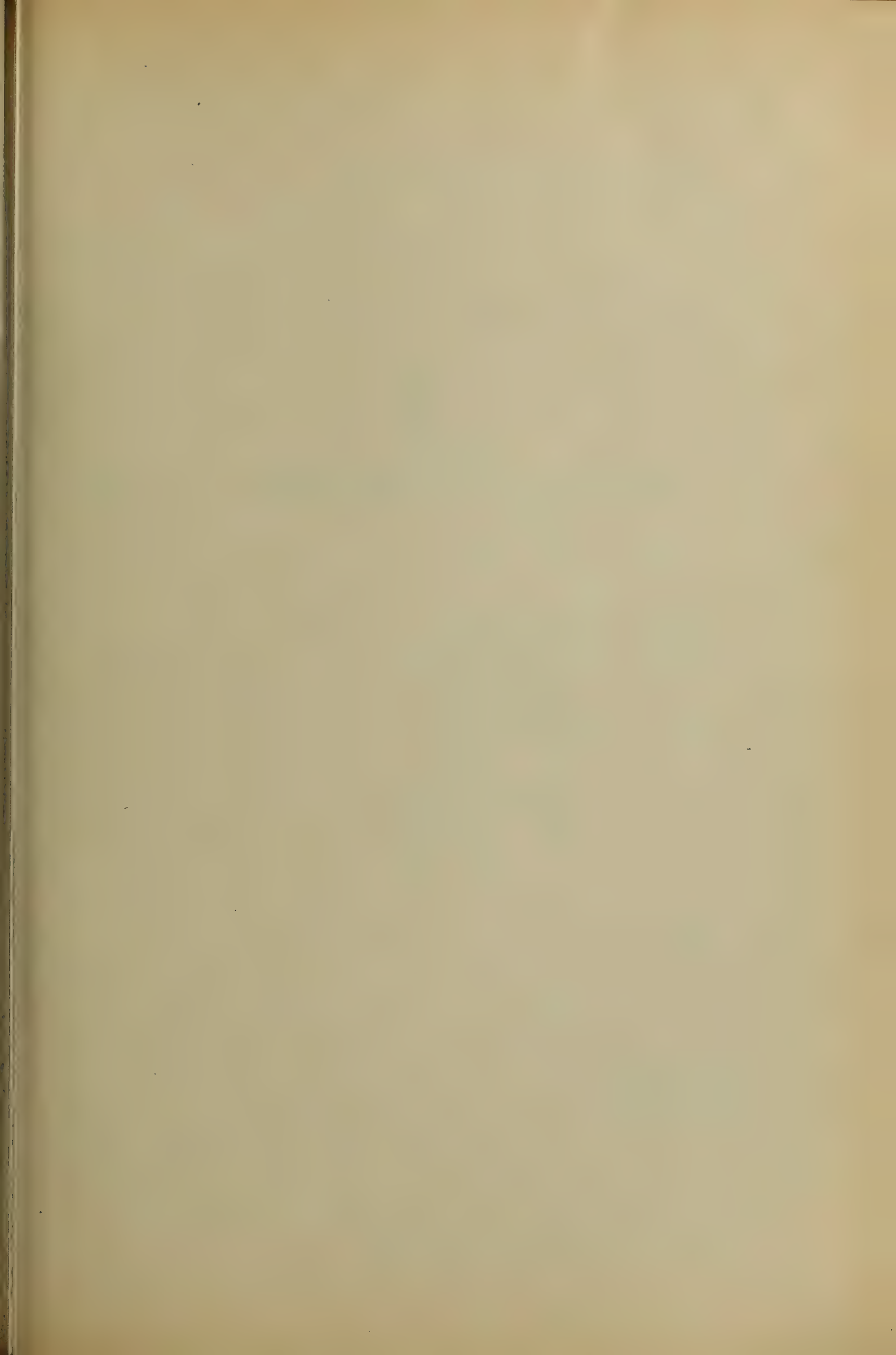
6 SHEETS—SHEET 5.

Fig. 7.



Attest:
Edgeworth Greene
De los Holden

Inventor:
Alexander N. Pierman
 by *Frank L. Hines* Atty.

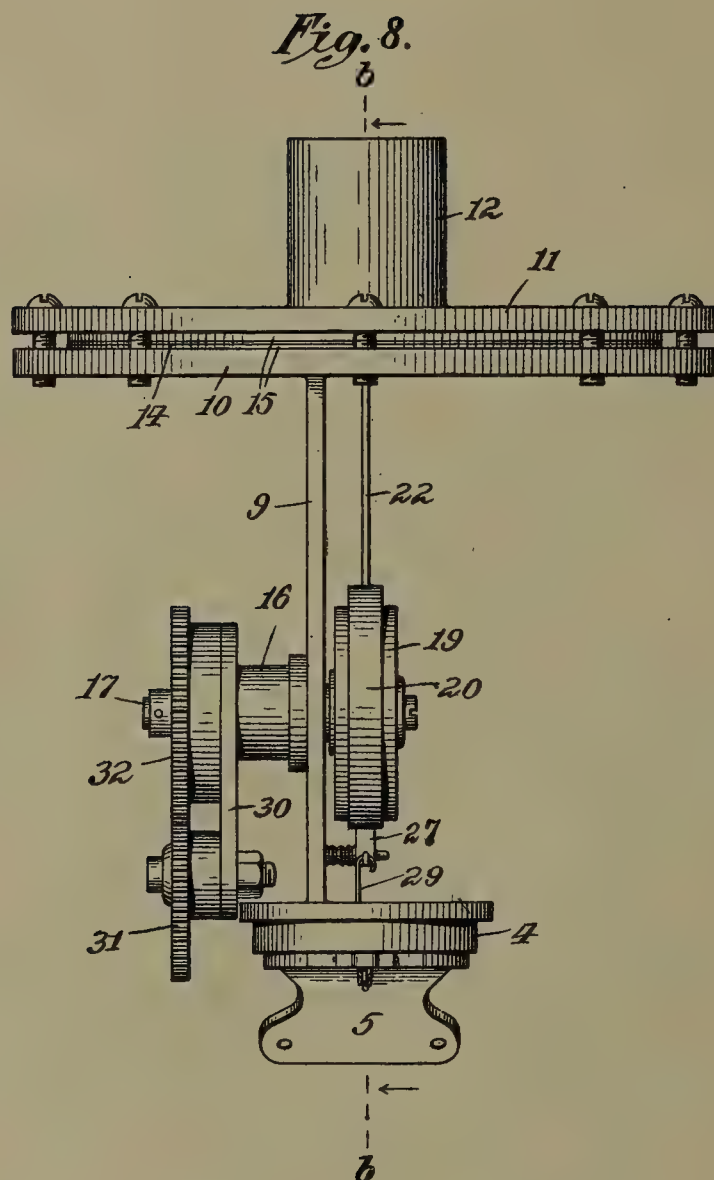


A. N. PIERMAN.

FRICTION REPRODUCING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED MAR. 13, 1905.

6 SHEETS—SHEET 6.



Attest:
Edgeworth Malone
 Delos Holden

Inventor:
Alexander N. Pierman
 by *Frank L. Spurr* Atty.

UNITED STATES PATENT OFFICE.

ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

FRICITION REPRODUCING ATTACHMENT FOR PHONOGRAPHS.

No. 867,597.

Specification of Letters Patent.

Patented Oct. 8, 1907.

Application filed March 13, 1905. Serial No. 249,687.

To all whom it may concern:

Be it known that I, ALEXANDER N. PIERMAN, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Friction Reproducing Attachments for Phonographs, of which the following is a specification.

My invention relates to sound reproducing devices of the type wherein the diaphragm is vibrated by means of a friction shoe engaging a continuously rotating friction wheel, the friction between the friction shoe and friction wheel being varied by varying the pressure of the friction shoe on the friction wheel, such variation in pressure being effected either directly or indirectly by the sounds to be reproduced. Devices of this type are well known and have been suggested for effecting the reproduction of ordinary sounds either directly as in the case of megaphones or indirectly as in the case of telephones or phonographs. The suggestion has also been made of actuating the friction block by means of levers, in order that the friction may be increased and thereby permit the reproduced sounds to be augmented. Examples of these suggestions are found in British patents to Hope-Jones No. 15,245 of 1890 and to St George No. 3473 of 1880.

My invention relates to improvements in apparatus of this type in its application to phonographs and allied talking machines, and my object is to provide an attachment for the purpose which can be readily applied to a phonograph at small cost and without interfering with the effective operation of the same.

The invention has particular reference to the means whereby the friction wheel may be continuously rotated while at the same time the friction wheel and parts coöperating therewith may be progressed longitudinally with respect to the record; also to the means for varying the leverage between the reproducing stylus and the friction shoe and further details of construction and operation, as will be more fully hereinafter described and claimed.

In order that the invention may be better understood, attention is directed to the accompanying drawings forming a part of this specification and in which—

Figure 1 is a plan view, showing in full lines my improved attachment applied to a well known type of Edison phonograph, the latter being illustrated in dotted lines, Fig. 2 an end elevation of the same, Fig. 3 a sectional view on the line *a—a* of Fig. 7, Fig. 4 a section on the line *b—b* of Fig. 8, Fig. 5 a plan view of the diaphragm box, Fig. 6 a side elevation of the attachment showing the reproducer stylus in engagement with the record, Fig. 7 a side elevation similar to Fig. 6, viewing the attachment from the opposite side, and, Fig. 8 a front elevation of the attachment.

In all the above views corresponding parts are represented by the same numerals of reference.

Broadly speaking, the invention consists of two parts, first, operating mechanism permanently applied to the talking machine but in no way interfering with the ordinary operation thereof when desired; and second, friction reproducing mechanism removably carried by the arm which sustains the ordinary reproducer, so as to be readily taken off when the ordinary reproducer is to be used, said friction reproducing mechanism coöperating with the operating mechanism, so as to continuously rotate the friction wheel as the reproducer progresses longitudinally with respect to the record.

The phonograph illustrated in Figs. 1 and 2 is of such common construction and the parts thereof are so well known to persons skilled in the art, that a description thereof is unnecessary. I arrange at the front of the instrument a fluted or pinion shaft 1 mounted in suitable bearings 2—2 and driven from the main shaft of the phonograph in any suitable way, as by gears 3—3. Removably carried in the usual supporting arm like the ordinary reproducer, is a cylindrical casing 4, to the underside of which is pivoted the usual floating weight 5. Pivoted on this floating weight is a small lever 6 carrying the reproducer stylus 7 engaging the record 8. A support 9 extends up from the casing 4 and carries a disk 10, opposing which is a corresponding disk 11 formed with a neck 12, to which the usual horn is applied. The disks 10 and 11 are clamped together by screws 13 to hold the large diaphragm 14 in place between the washers 15, as will be understood. The support 9 carries a bearing 16, in which is mounted a shaft 17 carrying the friction wheel 18, the latter being made of some very smooth substance, having a high coefficient of friction, preferably amber or a composition in which amber is employed. Said friction wheel is preferably provided with metallic rings 19 for the purpose of guiding the friction shoe and maintaining the same always in its proper relation to the friction wheel. The friction shoe 20 partly encircles the friction wheel and is provided with a pivoted extension 21 also engaging the friction wheel. The friction shoe is made as light as possible to minimize inertia and momentum and it may be lined with cloth, leather or similar material to increase the friction with the friction wheel. A pivoted link 22 connects the extension 21 of the friction shoe with the diaphragm 14. The friction shoe 20 is provided with a finger 23 connected to the pivoted adjusting lever 24 by means of a spring 25. The lever 24 is mounted on the support 9 and is adjusted by a screw 26, whereby the tension of the spring 25 may be varied to regulate the initial pressure of the friction shoe on the friction wheel. Engaging the

finger 23 is a small bell crank lever 27, whose other member is formed with a series of holes 28 from any one of which extends a link or wire 29 to the stylus lever 6 whereby the leverage between the reproducer
5 stylus and the friction shoe may be varied as will be evident.

The bearing 16 carries a support 30 on which is mounted a spur gear 31 adapted to mesh with the pinion shaft 1, so as to be rotated by the latter. At the
10 same time, the spur gear may move longitudinally of the pinion shaft as the reproducer stylus tracks the record. The friction wheel 18 is rotated from the gear 31 in any suitable way, as for example, by a gear 32 on the shaft 17, meshing with said gear wheel 31. It
15 will be evident that in applying my attachment to a phonograph or other talking machine, the only permanent attachment to the talking machine is the pinion shaft 1 and its driving mechanism, but this does not in any way interfere with the operation of the talking
20 machine or detract from the appearance thereof. The rest of the device is applied to the usual holding arm in the same way as the ordinary reproducer, and can be removed as readily. Furthermore, in raising or lowering the holding arm to lift the reproducer stylus from
25 or engage it with the record, the spur gear 31 will be simultaneously raised from or lowered into engagement with the pinion shaft 1. In other words, the friction wheel is not rotated except when the reproducer is in engagement with the record, thereby re-
30 ducing wear on the parts and preventing the transmission of noises, resulting from the rotation of the friction wheel. In operation the screw 26 will be adjusted so as to secure the desired initial pressure between the friction shoe 20 and the friction wheel, and
35 a record having been placed on the usual mandrel of the phonograph, the holding arm will be lowered so as to engage the reproducing stylus with the record, and simultaneously engage the spur gear 31 with the rotating pinion shaft 1. The friction wheel rotating

at a constant speed in the direction of the arrow will
40 obviously exert stress on the diaphragm 14. Consequently as the reproducer sapphire vibrates, the friction between the friction shoe and wheel will be correspondingly varied, to thereby vibrate the diaphragm 14 with the desired amplification but in accordance
45 with the record.

Having now described my invention, what I claim as new therein and desire to secure by Letters Patent is:

1. In a friction reproducing attachment for phonographs and allied talking machines, the combination with
50 a pinion shaft mounted in fixed bearings, of friction reproducing means movable longitudinally of the record to be reproduced and a gear cooperating with the friction reproducing means and meshing continuously with said shaft, as and for the purposes set forth. 55

2. In a friction reproducing attachment for phonographs and allied talking machines, the combination with a pinion shaft mounted in fixed bearings, of a support movable longitudinally of the record, a friction wheel carried by said support, friction reproducing de-
60 vices operated by said wheel and a gear for driving said wheel and meshing with said shaft, substantially as set forth. 60

3. In a phonograph or allied talking machine, the combination with the feed screw, feed nut, guide rod and
65 traveling carriage sleeved thereon, of reproducing means comprising a friction wheel carried by said carriage, means carried by the frame for driving said friction wheel, the arrangement of parts being such that the raising of the carriage disconnects the friction wheel from
70 its said driving means, substantially as set forth. 70

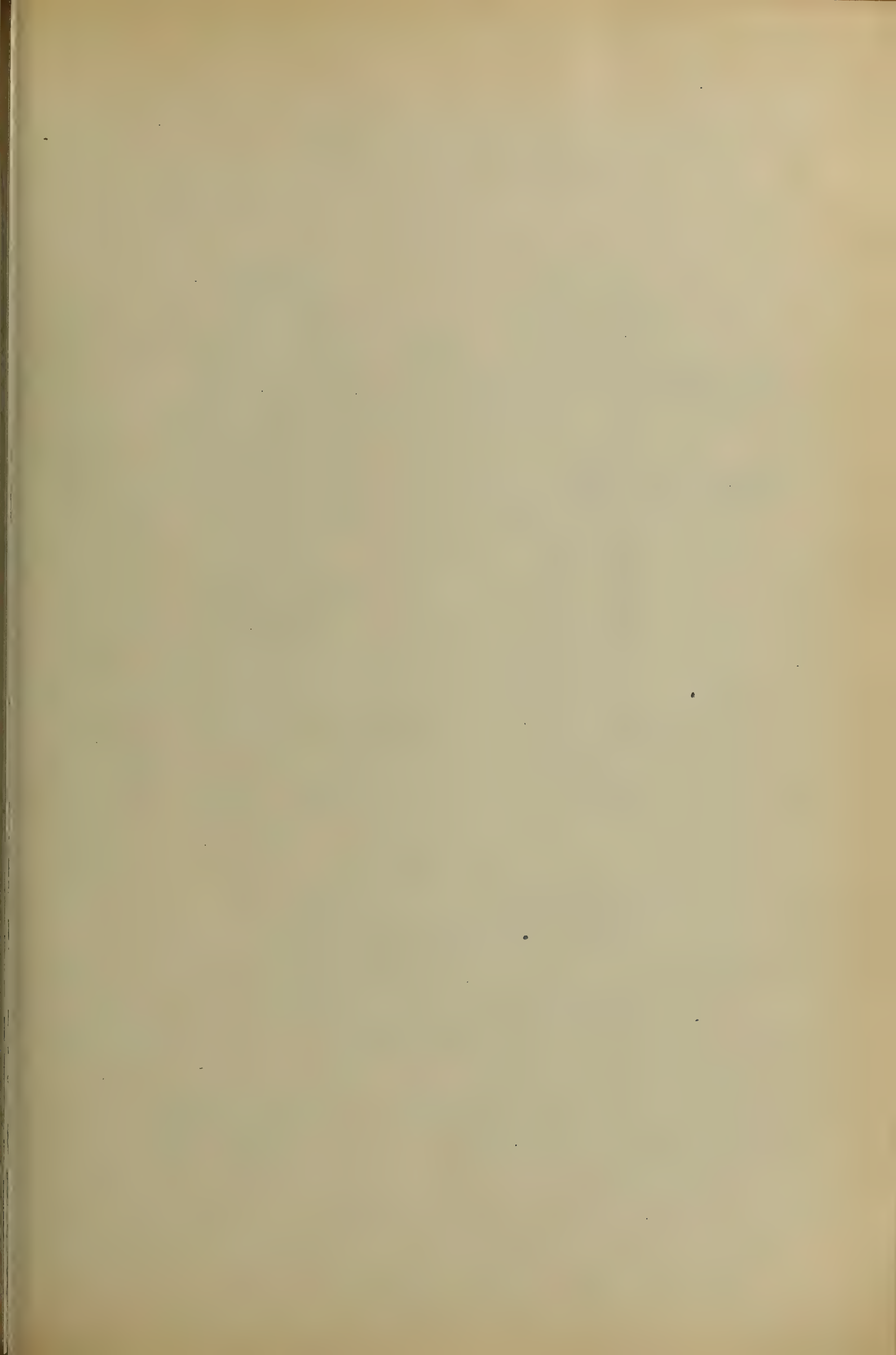
4. The combination with a talking-machine and a relay-device therefor comprising a reproducer and the relatively stationary part of the relay-device proper, the relatively movable part of said relay device, and a de-
75 tachable bracket carrying means for rotating said movable part. 75

This specification signed and witnessed this 10th day of March 1905.

ALEXANDER N. PIERMAN.

Witnesses:

DELOS HOLDEN,
ANNA R. KLEHM.



A. DEE P. WEAVER & J. E. CARNEY.
ATTACHMENT FOR TALKING MACHINES.

APPLICATION FILED MAR. 15, 1907.

2 SHEETS—SHEET 1.

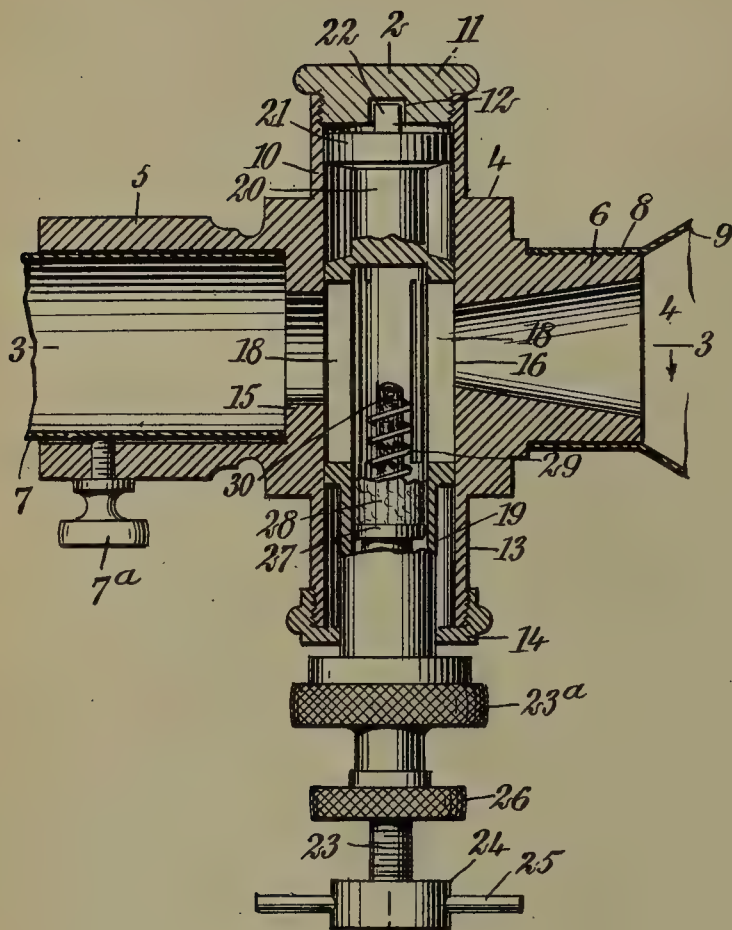


Fig. 1

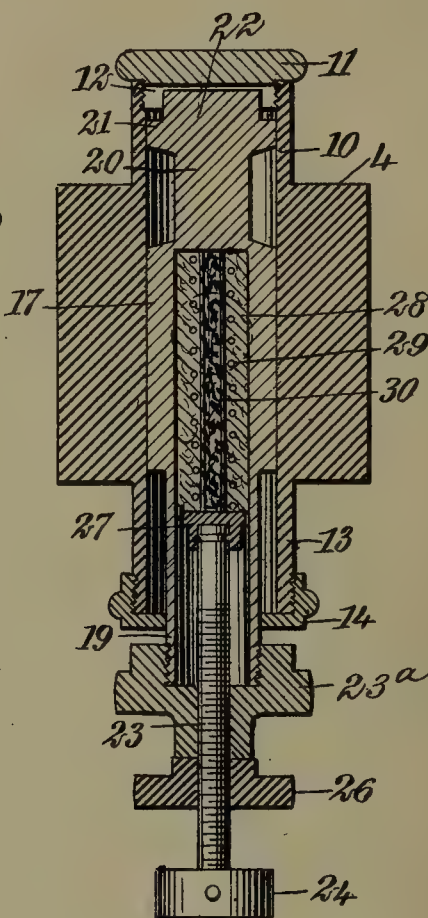


Fig. 2

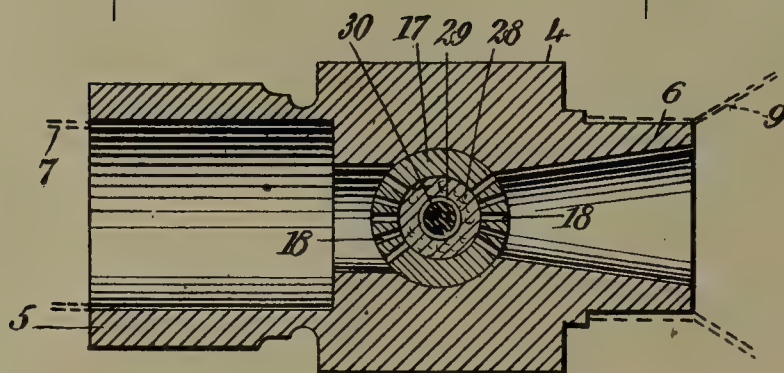


Fig. 3

WITNESSES
John A. Bergstrom
Walter Harrison

INVENTORS
Alfred dee Pinckney Weaver
John Edward Carney
BY *Mum Co*

ATTORNEYS

A. DEE P. WEAVER & J. E. CARNEY.
ATTACHMENT FOR TALKING MACHINES.

APPLICATION FILED MAR. 16, 1907.

2 SHEETS—SHEET 2.

Fig. 4

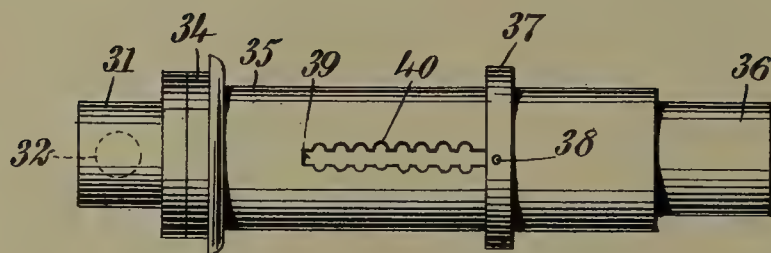


Fig. 5

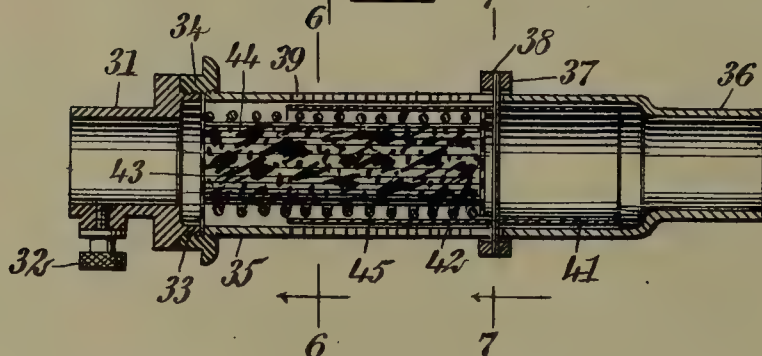


Fig. 6

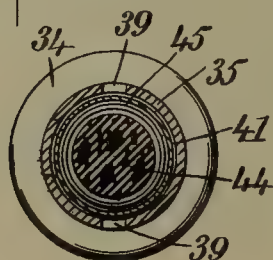
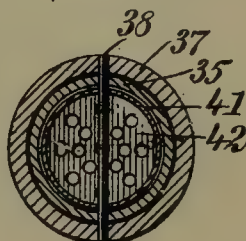


Fig. 7



WITNESSES

John A. Douglass
Walton Harrison

INVENTORS

Alfred dee Pinckney Weaver
John Edward Carney

BY

Mum & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

ALFRED DEE PINCKNEY WEAVER AND JOHN EDWARD CARNEY, OF MONTGOMERY,
ALABAMA; SAID WEAVER ASSIGNOR TO SAID CARNEY.

ATTACHMENT FOR TALKING-MACHINES.

No. 867,773.

Specification of Letters Patent.

Patented Oct. 8, 1907.

Application filed March 15, 1907. Serial No. 362,473.

To all whom it may concern:

Be it known that we, ALFRED DEE PINCKNEY WEAVER and JOHN EDWARD CARNEY, both citizens of the United States, and residents of Montgomery, in the county of Montgomery and State of Alabama, have invented a new and Improved Attachment for Talking-Machines, of which the following is a full, clear, and exact description.

Our invention relates to sound recording and reproducing machines, including phonographs, graphophones, and all other types of so-called talking machines.

Reference is made to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a fragmentary, horizontal section through the attachment, showing how it is connected with the horn and with the recorder or reproducer, as the case may be, of the talking machine, and also showing the porous material for breaking up the resonance of the air column; Fig. 2 is a central vertical section upon the line 2—2 of Fig. 1, showing more particularly the internal construction of the attachment and the details of the porous material used for destroying the resonance of the air column; Fig. 3 is a section upon the line 3—3 of Fig. 1, looking in the direction of the arrow, and showing the cylindrical grid used for containing the porous material, and also for adjusting the device so as to regulate the volume of sounds; Fig. 4 is a plan view of a modified form of our attachment and showing the movable collar used for controlling the degree of compression of the porous material; Fig. 5 is a central section through the construction shown in Fig. 4 and showing the material used as a compressible mass of sponge rubber encircled by a spring for restoring the mass after compression; Fig. 6 is a vertical cross section upon the line 6—6 of Fig. 5 looking in the direction of the arrow, and showing the concentric arrangement of the mass of sponge rubber, the spring encircling the mass, and the telescopic tubes encircling the rubber and spring; and Fig. 7 is a vertical cross section upon the line 7—7 of Fig. 5, looking in the direction of the arrow and showing the pin for holding the telescopic tubes in various predetermined positions, thereby regulating the degree of compression of the sponge material.

A casing 4 is provided with collars 5, 6, the collar 5 being adapted to engage a tube 7 of the recorder or reproducer, as the case may be, and the collar 6 being adapted to fit into the smaller end 8 of a horn 9. A set screw 7^a is revolubly mounted within the collar 5 and is adapted to engage the tube 7 for the purpose of holding the collar 5 upon the latter. This set screw 7^a also enables the collar 5 to be adjusted within proper

limits upon the tube 7. The casing 4 is further provided with a tubular extension 10 into which fits a screw cap 11 having a slot 12 disposed internally thereof. The casing 4 is still further provided with a tubular extension 13 over which fits an annular screw cap 14. Within the casing 4 are sound passages 15, 16 in registry with each other, the passage 16 being frusto-conical in shape. Revolubly mounted within the casing 4 is a cylinder 17 provided with oppositely disposed sound passages 18 arranged in two groups, as indicated in Fig. 3. The cylinder 17, thus provided with the sound passages 18, constitutes a cylindrical grid. This grid is provided with a tubular extension 19 and with a reduced portion 20, the latter terminating in a head 21. This head is provided with lug 22 adapted to fit neatly into the slot 12, so as to prevent rotation of the cylindrical grid 17 when the lug is inserted within the slot, as indicated in Fig. 1.

A screw 23 passes through an annular screw cap 23^a, the latter being mounted upon the tubular extension 19 of the cylindrical grid. A disk 24 is mounted upon the outer end of the screw 23 and a pin 25 extends through the disk 24 and screw 23 for enabling the screw to be turned at will. A nut lock 26 is mounted upon the screw 23 and is adapted to engage the screw cap 23^a so as to prevent movement of the screw 23. A head 27 is swiveled upon the screw 23 and is adapted to move within the tubular extension 19, and also within the cylindrical grid 17, these parts being continuations of each other.

A mass 28, of compressible porous material, preferably raw cotton fibers, is arranged in the form of a cylinder and disposed within the cylindrical grid 17, projecting partly into the tubular extension 19 of the same. A spiral spring 29, of the so-called "compression type", is embedded within the porous material 28 and serves to restore the latter to its normal condition after having been compressed. A mass 30 of sponge rubber, or other material having interstices, is mounted centrally within the tubular mass 28 of porous material, and is encircled by the spiral spring 29. Preferably the spring 29 does not directly engage the sponge rubber.

The operation of the device shown in Figs. 1, 2 and 3 is as follows: The collar 5 being fixed upon the tube 7 of the reproducer or recorder, and being properly adjusted, is tightened in position by the set screw 7^a. The horn 9 is next mounted in position by slipping its smaller end 8 over the collar 6. The degree of compression desired for the sponge rubber 30 and the porous, fibrous material 28, is now determined upon, and the screw 23 is turned accordingly. To this end the lock nut 26 is first loosened, and after adjustment of the screw, is tightened. The cylindrical grid 17 is now turned (see Fig. 3) to any desired angle by aid of the

screw cap 14. This exposes any desired number of slots 18. In order to be able to turn the nut lock 26 and to adjust the screw caps 23^a and 14, the lug 22 is inserted within the slot 12, as indicated in Fig. 1.

5 This prevents rotation of the cylindrical grid 17 until the adjustments are completed. The sounds passing through the sound passages 15, 16 necessarily pass in a lateral direction through the cylindrical grid 17 and through the cylinder 28 of porous material, also through

10 the sponge rubber 30. The resonance of the air column in occupying the air passage 15, 16 is broken up, as above described and the intensity of the sound may be altered and to any desired degree depending upon the compression exerted by the screw 23. If, now, it be

15 desired to restore the talking machine to its usual condition; or in other words, to remove the agency used for breaking up the resonance of the air column, the cylindrical grid 17 is moved axially outward (toward the bottom of the sheet according to Figs. 1 and 2).

20 The reduced portion 20 is thus brought into alinement with the air passages 15, 16, and the sound waves by passing around this reduced portion are not compelled to pass through the cylindrical grid or the compressible media contained by it.

25 In the form shown in Fig. 4 a collar 31 is provided with a screw 32 whereby it may be secured upon the tube of a reproducer or a recorder, as the case may be, and held in position firmly by the screw 32. An annular neck 33 is threaded internally and is fitted with

30 an annular collar 34 threaded internally. A cylindrical barrel 35 is threaded at one of its ends and fitted within the collar 34, the other end 36 of this cylindrical barrel being somewhat reduced. An annular collar 37 encircles the cylindrical barrel 35 and carries a pin

35 38 extending diametrically through this cylindrical barrel. For this purpose a slot 39 is provided. In order that the pin 38 may be lodged at any predetermined point along the slot 39, the latter is merged into indentations 40, as will be understood from Fig. 4.

40 An inner cylinder 41 is telescopically mounted within the barrel 35. A perforated disk 42 is mounted within the inner cylinder 41 and secured rigidly thereto. Another perforated disk 43 is clamped between one end of the barrel 35 and the collar 34. A mass 44, of sponge

45 rubber, is encircled by a spiral compression spring 45, the latter being loosely mounted within the inner cylinder 41. In order to compress the mass 44 of sponge rubber, the collar 38 is pushed to the left, according to Fig. 6, carrying with it the pin 38 and inner tube 41.

50 This shortens the member of sponge rubber and also compresses the spring 45. In order to lock the parts in this position, the collar 37 is next turned slightly to the right, or to the left, as the case may be, so as to lodge the pin 38 in a pair of the indentations 40. In

55 order to allow the sponge rubber to expand to any desired extent, the pin 38 is loosened from the indentations 40, by slightly turning the collar 48, and is removed to the right according to Fig. 5. The horn is fitted upon the reduced portion 36 of the barrel 35.

60 The general action of the device shown in Figs. 4, 5 and 6 will be substantially the same as that shown in the other figures; that is to say, the sponge rubber is compressed or allowed to expand, according to the

degree of porosity which the operator desires to confer upon it, and which is, therefore, regulated at will. 65
The resonance of the air column is prevented, as above described, with reference to Figs. 1, 2 and 3.

Having thus described our invention, we claim as new and desire to secure by Letters Patent:

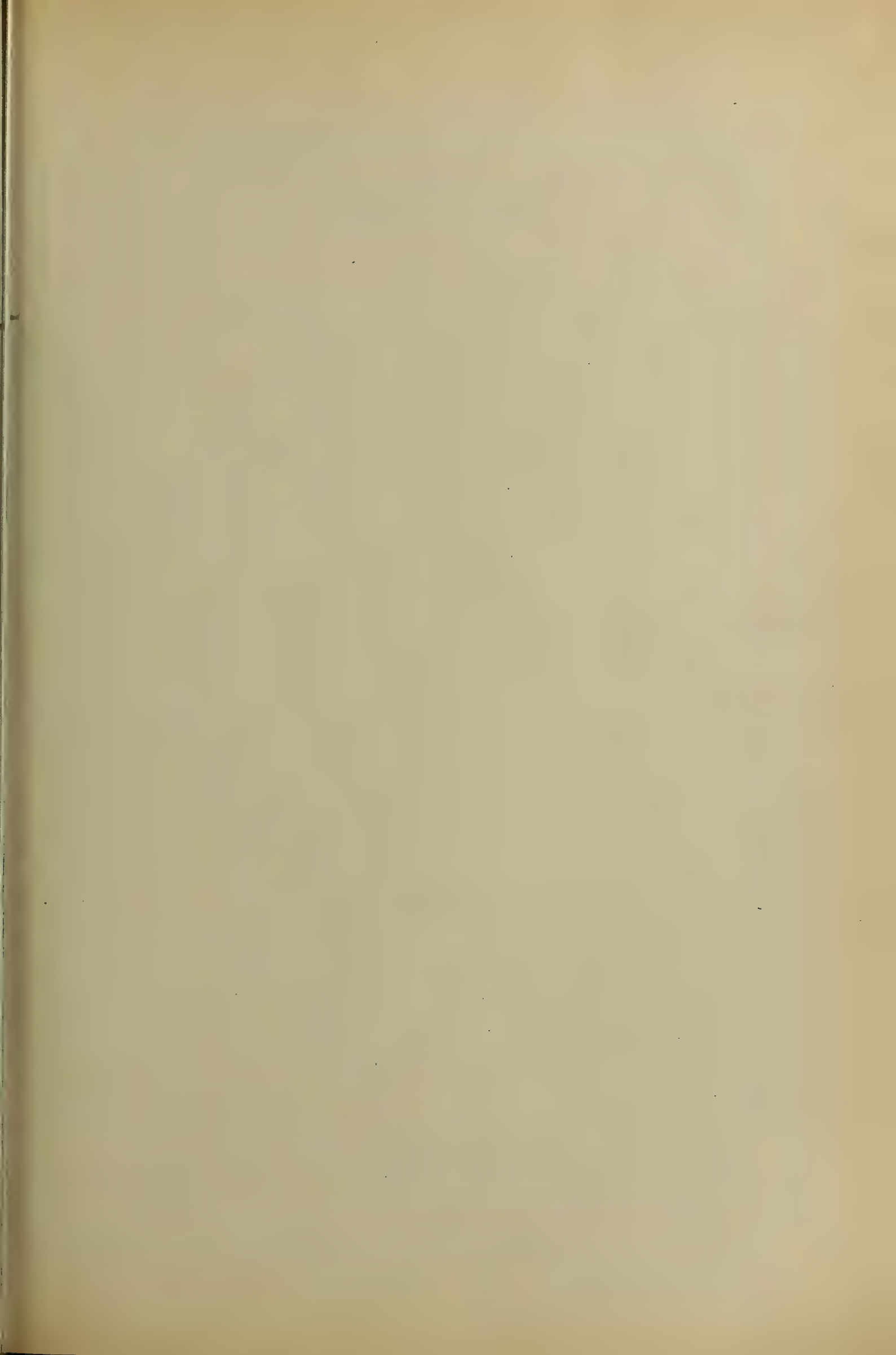
1. The combination of a casing, a grid mounted therein, a mass of porous material connected with said grid for permitting passage of sound waves therethrough while preventing undue resonance, and means controllable at will for changing the position of said grid for the purpose of affecting sounds passing through the same. 70
2. The combination of a casing, a cylindrical grid mounted therein, a mass of porous material mounted within said cylindrical grid, means controllable at will for exerting different degrees of pressure upon said material for the purpose of governing the porosity thereof, and means for moving said cylindrical grid for the purpose of affecting the sounds passing through said material. 75
3. The combination of a member provided with a sound passage, a cylindrical grid mounted within said sound passage, a member of rubber sponge mounted within said cylindrical grid, a cylinder of cotton fiber encircling said rubber member, a spring for restoring said rubber member and said cylinder of cotton fiber after compression of the same, and means controllable at will for compressing said rubber member and said cylinder of cotton fiber to a predetermined extent. 80
4. The combination of a longitudinal hollow member provided with a sound passage, a mass of porous material mounted within said sound passage and extending transversely of the general axis thereof, and means for compressing said mass of porous material in a direction crossing said axis of said longitudinal hollow member. 85
5. The combination of a casing, a revolvable cord mounted therein for the purpose of regulating the capacity of said casing for transmitting sound waves, and a mass of porous material mounted within said cord and compressible in a direction crossing the general direction of propagation of said sound waves. 90
6. The combination of a casing, a revolvable cord mounted therein and provided with slots serving as sound passages, and means for turning said cord relatively to said casing. 95
7. The combination of a casing provided with a sound passage, a revolvable cord mounted within said casing and partially obstructing the same, the axis of said cord crossing the general direction of propagation of the sound waves, and means for moving said cord in the general longitudinal direction of its own axis of rotation, for the purpose of partially obstructing said sound waves. 100
8. The combination of a casing provided with a sound passage, a revolvable cord mounted within said casing and provided with sound passages, and means for securing said revolvable cord in a predetermined fixed position. 105
9. The combination of mechanism provided with a sound passage, a member of compressible material partially obstructing said sound passage, and a spiral spring depressed within said member of compressible material, and means for compressing said compressible material and said spiral spring. 110
10. The combination of a casing provided with a sound passage extending therethrough, a core of compressible material mounted within said casing and adapted to partially obstruct the propagation of the sound waves therethrough, a central spring disposed concentrically to said core of compressible material, and means controllable at will for compressing both said core and said spring, to any desired extent. 115

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ALFRED DEE PINCKNEY WEAVER.
JOHN EDWARD CARNEY.

Witnesses:

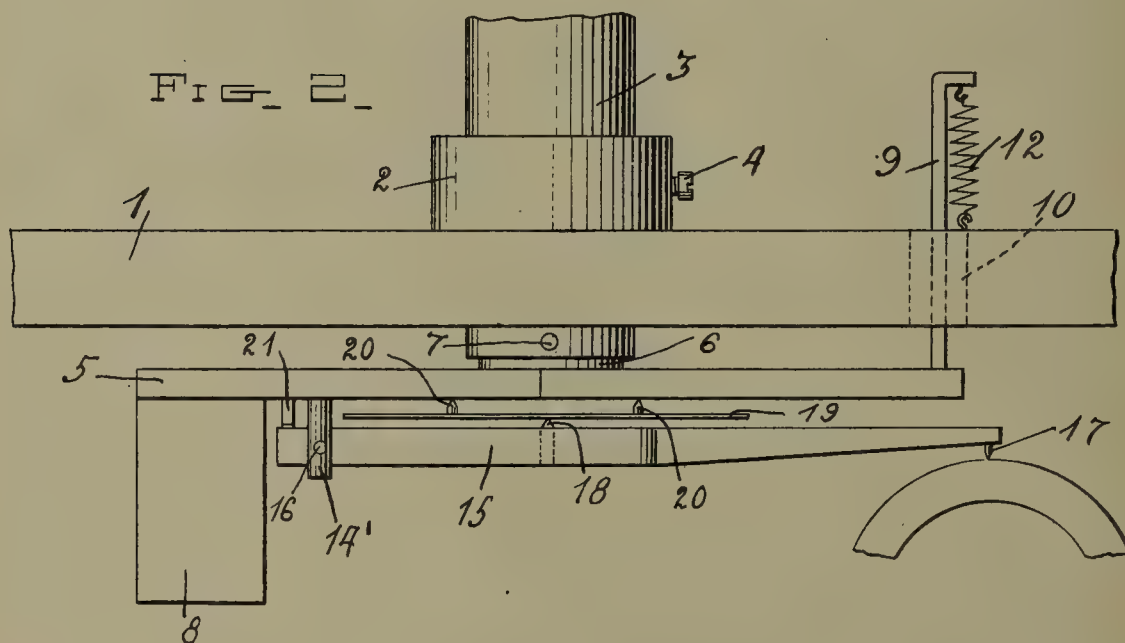
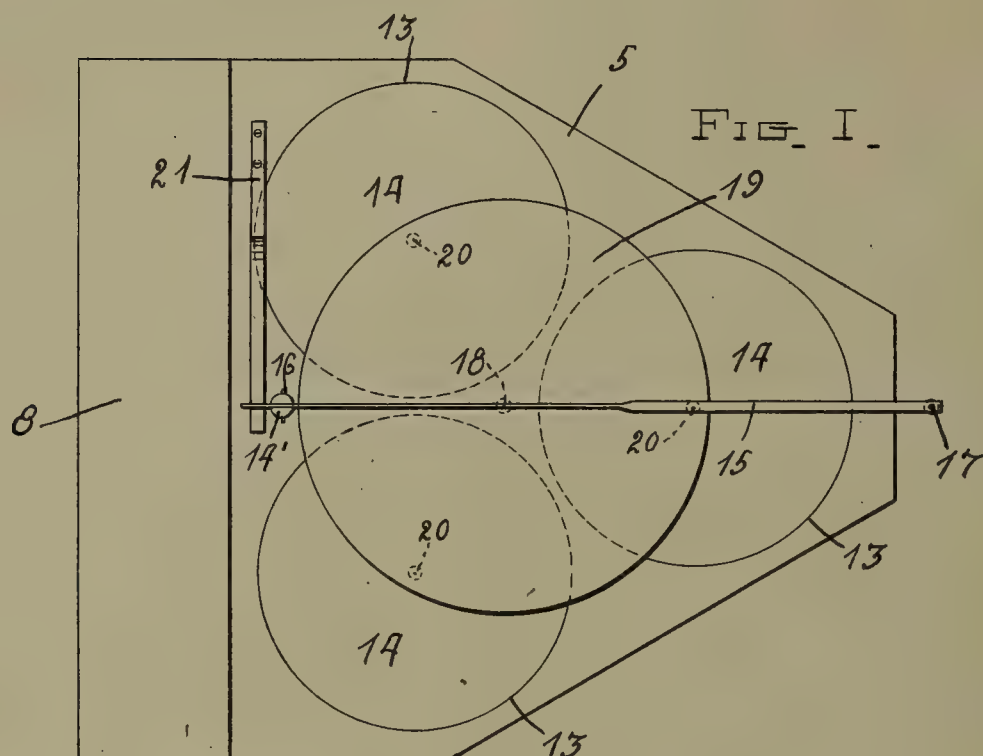
DORIS FABER,
D. G. WHITTINGTON.



No. 867,821.

PATENTED OCT. 8, 1907.

W. HART.
SOUND REPRODUCER FOR GRAPHOPHONES.
APPLICATION FILED MAY 4, 1907.



Witnesses

J. Milton Jester.
C. H. Griesbauer

Inventor
WILLIAM HART

by *H. B. Wilson & Co.*
Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM HART, OF KIRKSVILLE, MISSOURI.

SOUND-REPRODUCER FOR GRAPHOPHONES.

No. 867,821.

Specification of Letters Patent.

Patented Oct. 8, 1907.

Application filed May 4, 1907. Serial No. 371,928.

To all whom it may concern:

Be it known that I, WILLIAM HART, a citizen of the United States, residing at Kirksville, in the county of Adair and State of Missouri, have invented certain new and useful Improvements in Sound-Reproducers for Graphophones; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

10 This invention relates to improvements in sound reproducers for graphophones, and the like.

The object of the invention is to provide a device of this kind by means of which the volume of sound will be greatly increased and made more clear and distinct.

15 With this object in view, the invention consists of certain novel features of construction, combination and arrangement of parts as will be more fully described and particularly pointed out in the appended claims.

20 In the accompanying drawings, Figure 1 is a side view of a sound reproducer constructed in accordance with the invention; and Fig. 2 is a bottom plan view of the same.

Referring more particularly to the drawings, 1 denotes a portion of the frame of the graphophone to which the reproducer is attached. On the frame 1 is arranged a sleeve or collar 2 in which is adjustably mounted the lower reduced end of the horn, or sound transmission device, 3, said end being secured in the collar 2 by means of a set screw 4. Pivottally mounted on the lower end of the horn 3 is a diaphragm plate 5, said plate being provided with an inwardly projecting tubular boss 6, which is adapted to be inserted in the lower end of the horn 3, and is pivottally connected to said end by pivot studs or pins, 7.

35 On the lower side of one end of the plate 5 is a weight 8, and to the opposite end is secured an upwardly projecting arm or bar 9, which is adapted to work through a slot or passage, 10, in the frame 1, as shown. The upper end of the arm 9 is bent at right angles, and to said bent end is connected the upper end of a counterbalancing spring 12, the lower end of which is connected to the frame 1. The spring 12 is here shown as a light coil spring, the tension of which is exerted to counterbalance the weight 8 arranged on the opposite end of the diaphragm plate 5. The plate 5 is substantially triangular in shape and is provided with a plurality of circular openings, 13, three of which are shown in the present instance, and is the preferred number employed. In the openings 13 are arranged diaphragms 14, which may be formed of any suitable material, but which are preferably formed of thin sheets of aluminium.

On the underside of the plate 5 adjacent to the weighted end of the same is formed a downwardly projecting centrally disposed bearing stud, 14', the lower end of which is bifurcated and adapted to receive the inner end of a record engaging lever 15, said lever being

pivoted in the stud 14' by a pivot pin 16. The lever 15 is reduced in thickness substantially midway between its ends to form a spring construction for the inner pivoted end of the lever, whereby the point 17 on the outer end of the lever may readily engage and follow the grooves on the record.

Formed on the upper edge of the inner portion of the lever 15 is an upwardly projecting bearing point 18 upon which is mounted a thin aluminium transmission disk, 19, by means of which the vibrations or movements of the lever 15, caused by its engagement with the grooves in the record, are transmitted to the diaphragms 14 in the plate 5. The disk 19 is provided on its upper side adjacent to its outer edge with a series of diaphragm engaging points, 20, which are arranged at equal distances apart around the disk and in position to be engaged with the center of each of the diaphragms, 14.

By providing the transmission disk 19, the vibrations from the record are simultaneously imparted or transmitted to the three diaphragms, thereby causing the latter to vibrate and reproduce the sound as one diaphragm, the sound vibrations thus produced from the three diaphragms being greatly increased and made more clear and distinct. The sound vibrations from the diaphragms are conducted through the tubular boss 6 into the sound transmitting horn, where it is further amplified and increased in volume.

Connected to the underside of the plate 5, and adapted to bear upon the inner end of the lever 15, is a light spring 21 which is adapted to hold the lever 15 in position to support the transmission disk, 19, in engagement with the diaphragms when the outer end of the lever is not in engagement with or supported by the record. The spring 12 connected to the arm 9 on the end of the lever 15 is adapted to counterbalance the weight 8 at the opposite end of the plate 5 and force the point 17 on the outer end of the lever 15 downwardly into engagement with the grooves on the record.

From the foregoing description, taken in connection with the accompanying drawings, the construction and operation of the invention may be readily understood without requiring a more extended explanation.

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention as defined in the appended claims.

Having fully described my invention, what I claim as new and desire to secure by Letters-Patent, is:

1. A sound reproducer for graphophones, comprising a pivottally mounted diaphragm plate, diaphragms arranged in said plate, a record engaging lever pivottally mounted on said plate, and a transmission disk supported by said lever and held in engagement with said diaphragms, substantially as described.

2. A sound reproducer for graphophones, comprising a

pivotally mounted diaphragm plate, a weight arranged on one end of said plate, a counterbalancing spring connected to the opposite end thereof, a plurality of diaphragms arranged in said plate, a record engaging lever, and a sound transmitting disk supported by said lever and held in engagement with said diaphragms, substantially as described.

3. A sound reproducer for graphophones, comprising a horn, a diaphragm plate pivotally mounted on the lower end of said horn, said plate having formed therein a plurality of diaphragm openings, a plurality of diaphragms arranged in said openings, a record engaging lever pivotally mounted to the underside of said plate, a sound transmission disk supported by said lever and held thereby in operative engagement with said diaphragms, a record engaging point on the outer end of said lever, and means to force the latter downwardly to engage said point with the grooves on the record, substantially as described.

4. A sound reproducer for graphophones, comprising a horn, means to adjustably secure the end thereof in the frame of the graphophone, a diaphragm plate pivotally

mounted on the lower end of said horn, said plate having formed therein a plurality of diaphragm openings, diaphragms in said openings, a weight secured to one end of said plate, a counterbalancing spring connected to the other end thereof, a pivot stud on the underside of said plate, a spring record engaging lever pivotally mounted in said stud, a record engaging point on the outer end of said lever, a bearing pin arranged upon the inner portion of the lever, a sound transmitting disk supported upon said bearing pin, diaphragm engaging points on said disk and adapted to be engaged with the diaphragms in said plate, and a spring to support said lever and disk when the former is disengaged from the record, substantially as described.

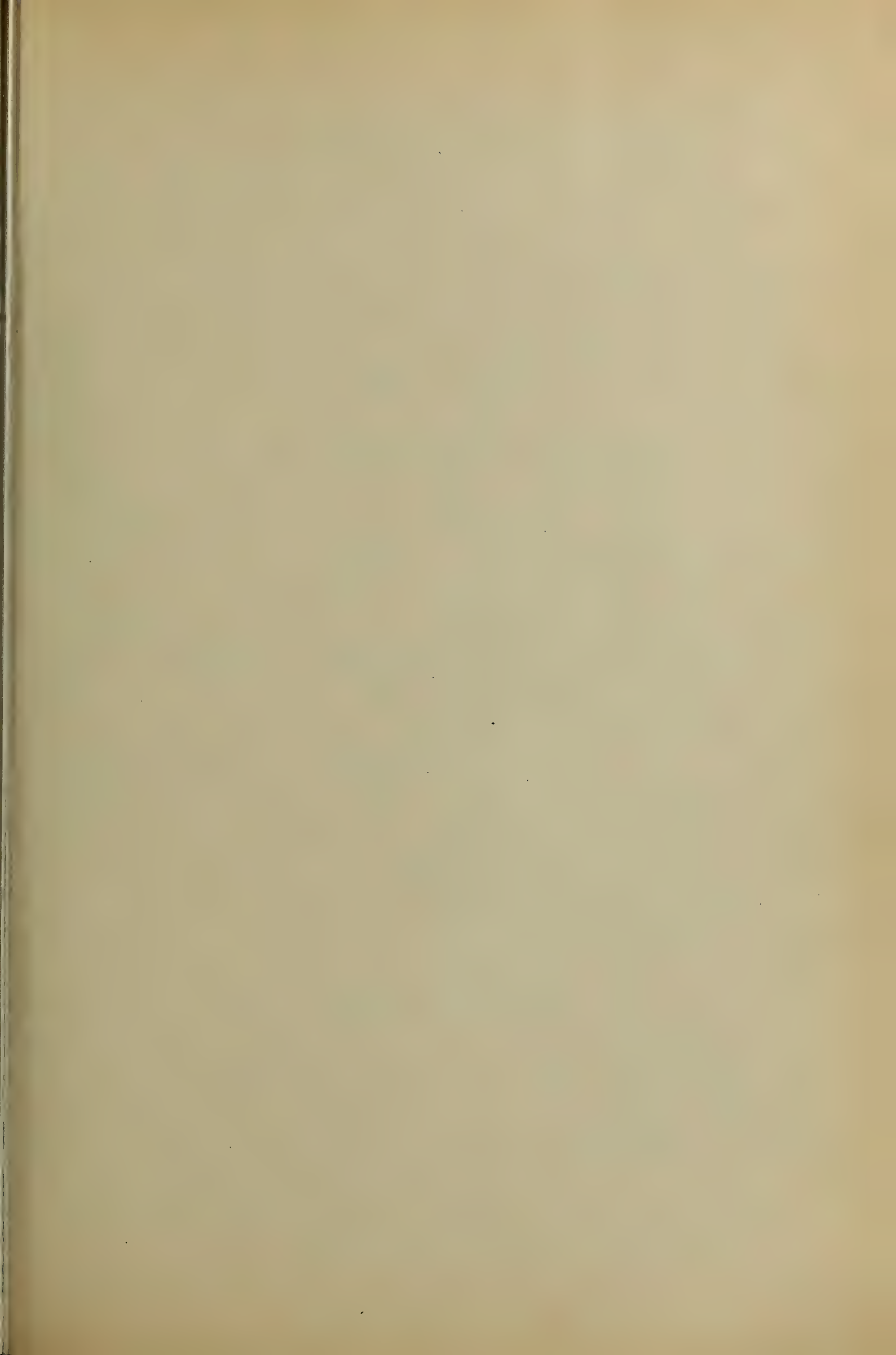
In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM HART.

Witnesses:

H. A. HART,

T. J. WHITZEL.



R. REVELL.

TRUMPET OR HORN OF SOUND REPRODUCING INSTRUMENTS.

APPLICATION FILED JULY 21, 1906.

Fig. 1.

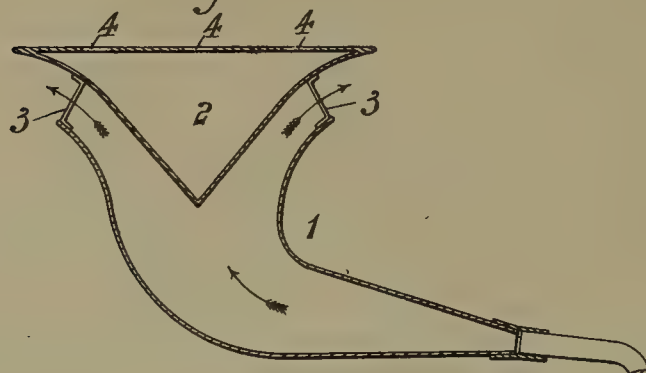


Fig. 2.

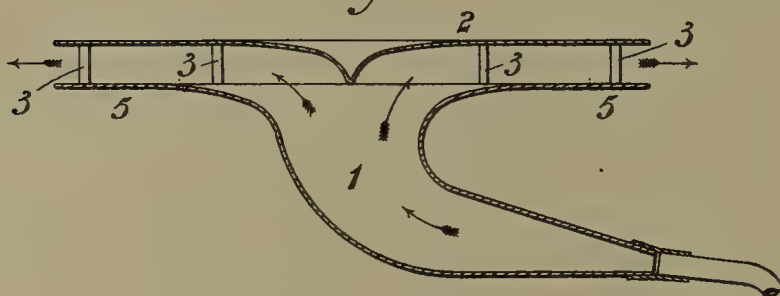


Fig. 3.

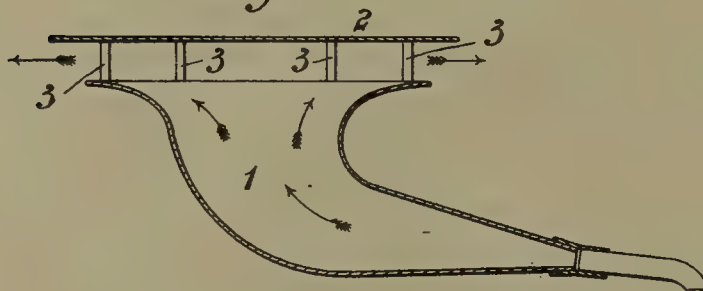
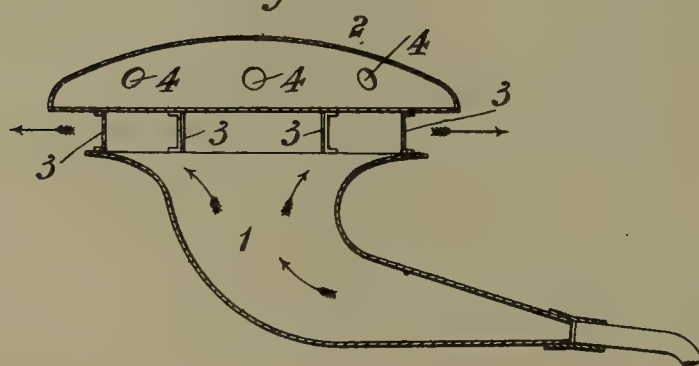


Fig. 4.



WITNESSES

William Abbe

Paul A. Blair.

INVENTOR

Roland Revell

by *Harrison and Harrison*
ATTORNEYS

UNITED STATES PATENT OFFICE.

ROLAND REVELL, OF WEST HAMPSTEAD, LONDON, ENGLAND, ASSIGNOR TO THOMAS KNIGHT BARNARD, OF STROUD, ENGLAND.

TRUMPET OR HORN OF SOUND-REPRODUCING INSTRUMENTS.

No. 867,836.

Specification of Letters Patent.

Patented Oct. 8, 1907.

Application filed July 21, 1906. Serial No. 327,233.

To all whom it may concern:

Be it known that I, ROLAND REVELL, a subject of the King of Great Britain and Ireland, residing at Shirland Lodge, Goldhurst Terrace, West Hampstead, in the county of London, England, composer of music, have invented certain new and useful Improvements in Connection with the Trumpets or Horns of Sound-Reproducing Instruments, of which the following is a specification.

This invention relates to horns for sound reproducing instruments, and particularly to deflectors for such horns.

The object of my invention is to provide a satisfactory deflector which may be attached at the mouth of the horn and is so constructed as to afford an annular aperture through which the sound issuing from the horn is deflected practically horizontally in all directions at once. In connection with the deflector, I prefer to add also a sounding board which may, for effect, be perforated.

In the accompanying drawings Figure 1 is a vertical section of a horn provided with my deflector with its accessory sounding board; Fig. 2 is a vertical section of a horn showing my deflector without a sounding board; Fig. 3 is a vertical section of a modified form of my deflector; while Fig. 4 is a vertical section of the same, provided with a sounding board.

At present the full power of sound from sound reproducing instruments is only heard when a person is in front of the trumpet, or horn, the sound waves being driven almost in a direct line, or only radiating to a limited extent, the result being that, if a sound reproducing instrument employing a trumpet or horn to increase the volume of sound, be played in a room, and the person listening to the sound be directly in front of the trumpet, or horn, the power or blast from the trumpet or horn is generally too great to be pleasant, and if a person be behind, or at the side of, the trumpet or horn, that person does not hear the full effect of the instrument, in consequence of the sound waves being driven forward from the front or bell of the trumpet or horn. The consequence is the volume of tone is very unequally distributed about the room. My deflector distributes the sound waves from such instruments more equally and also, to a great extent, prevents the unpleasant blast which now exists with the ordinary trumpet or horn.

Referring to the drawings, it will be seen that I insert or mount inside or over, or both inside and over, the mouth or bell of the trumpet or horn 1, a bell-shaped cone or other deflector 2, so as to leave an annular space for the passage of sound waves. The said bell-shaped cone, or deflector, can be held in position in or on the trumpet or horn by stays 3, or

other suitable means, which will prevent it from entering too far into, or will support it above, the mouth of the trumpet or horn. The effect of the said cone or deflector is to cause the sound waves to pass equally through the said annular passage and so be better distributed.

Instead of fitting the trumpet or horn to the sound reproducing instrument in a more or less horizontal position, as has been hitherto customary, I prefer to arrange the said trumpet or horn, in a vertical or nearly vertical, position, with the opening of the bell or large end of the trumpet or horn directed upwards.

The cone or deflector may be solid, or it may be hollow, and it may be constructed of any suitable material, such for example as metal, wood, celluloid, or the like. If it be made hollow, it may be provided with an opening, or openings 4, and then it will form a sound chamber, or act as a soundboard, and improve, or modify, the sound.

In Fig. 2 I have shown a trumpet or horn made with a horizontally extended lip 5 upon which the struts 3 support the deflector 2, which is made with a small conical central part directed downwards at the mouth of the trumpet, or horn 1, the outer part of the deflector extending parallel with the lip 5.

The same trumpet or horn can, if desired, be used in recording, or an ordinary trumpet or horn may be used for that purpose.

I claim as my invention

1. In combination with the trumpet or horn of a sound reproducing instrument, a sound deflector arranged at the mouth of the horn and secured to the latter and providing an annular aperture through which the sound is projected in all directions simultaneously in a plane practically at right angles to that at which it would normally issue from the horn.

2. In combination with the trumpet or horn of sound reproducing instruments, a sound deflector arranged at the mouth of the horn and secured to the latter and providing an annular aperture through which the sound is projected practically horizontally in all directions simultaneously.

3. In combination with the trumpet or horn for sound reproducing instruments arranged to discharge the sound in an approximately vertical direction, a sound deflector arranged at the mouth of the horn and secured to the latter and providing an annular aperture through which the sound is projected practically horizontally in all directions simultaneously.

4. In combination with the trumpet or horn of sound reproducing instruments, a sound deflector arranged at the mouth of the horn and secured to the latter and providing an annular aperture through which the sound is projected in all directions simultaneously in a plane practically at right angles to that at which it would normally issue from the horn, and a sounding board coöperating with said deflector.

5. In combination with the trumpet or horn of sound reproducing instruments, a sound deflector arranged at the mouth of the horn and secured to the latter and providing

an annular aperture through which the sound is projected in all directions simultaneously in a plane practically at right angles to that at which it would normally issue from the horn, and a perforated sounding board coöper-

5 ating with said deflector.

6. In combination with the trumpet or horn of a sound reproducing instrument having a flared lip, a sound deflector arranged at the mouth of the horn and having its deflecting surface substantially parallel to the lip of the

10 horn, and providing in connection therewith an annular

aperture through which the sound is projected in all directions simultaneously in a plane practically at right angles to that at which it would normally issue from the horn.

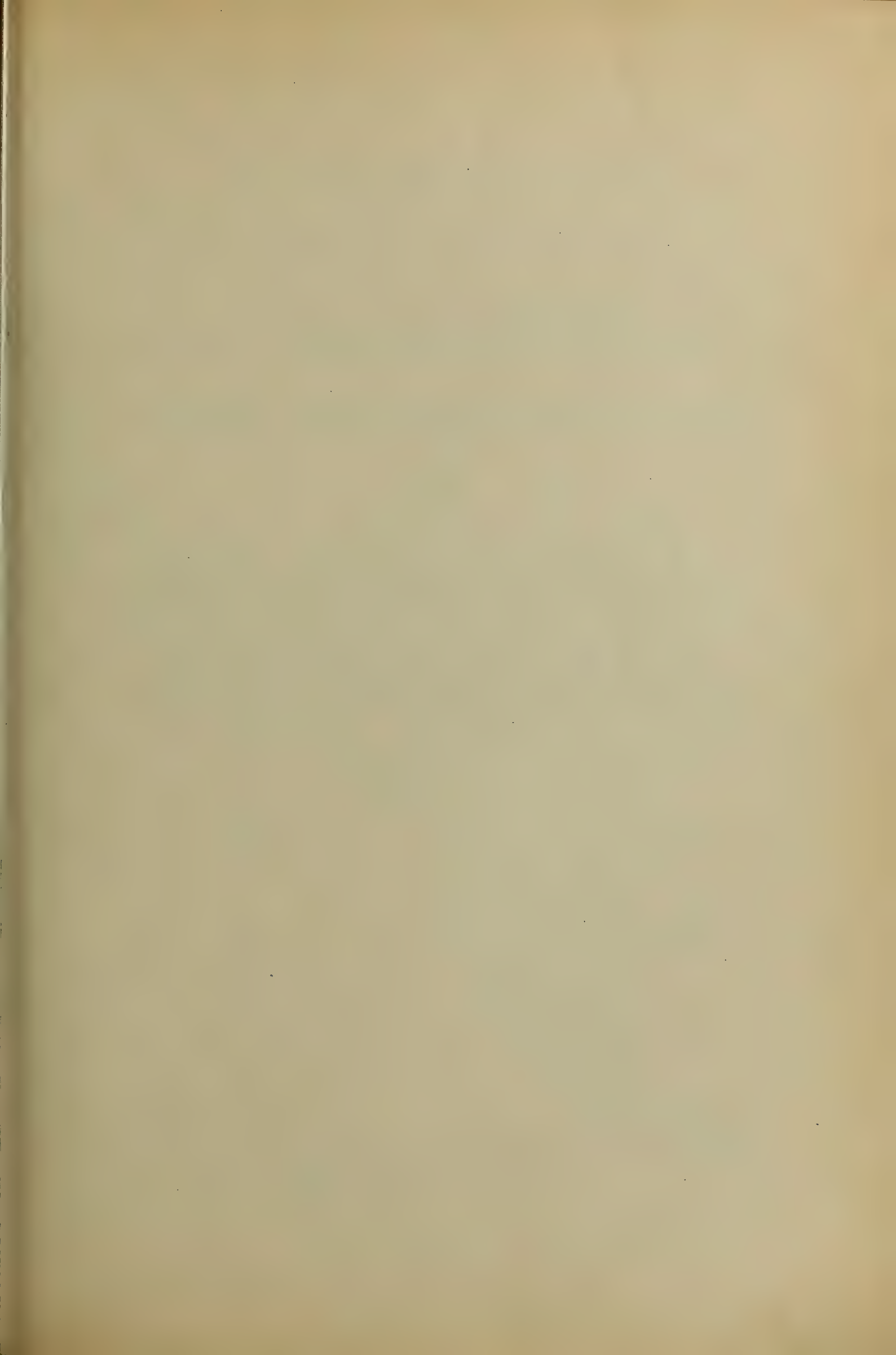
In testimony whereof I have signed this specification in 15 the presence of two subscribing witnesses.

ROLAND REVELL.

Witnesses:

ALVESTO S. HOGUE,

AUGUST FUGGER.



No. 867,975.

PATENTED OCT. 15, 1907.

W. H. HOYT.

METHOD OF MAKING MOLDED FLAT SOUND RECORDS.

APPLICATION FILED OCT. 17, 1906.

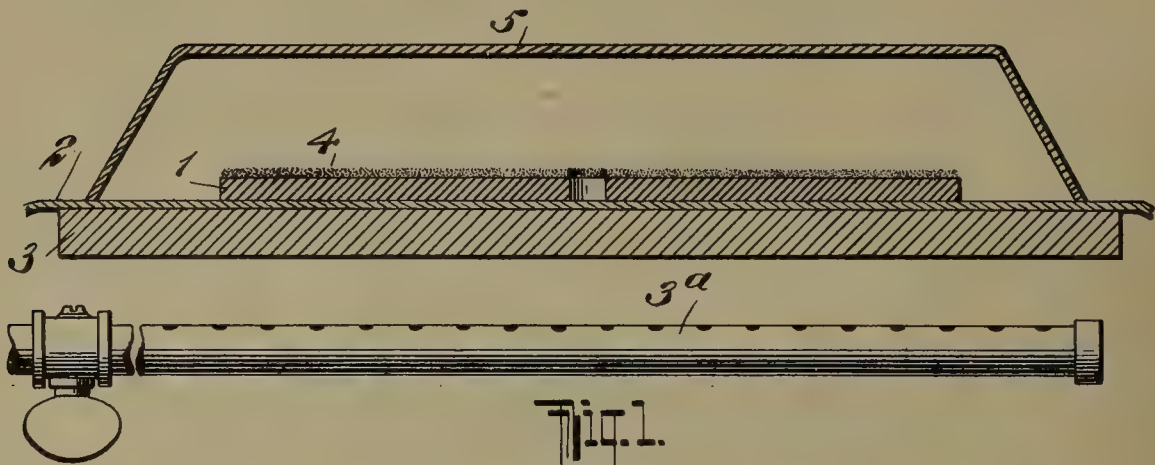


Fig. 1.

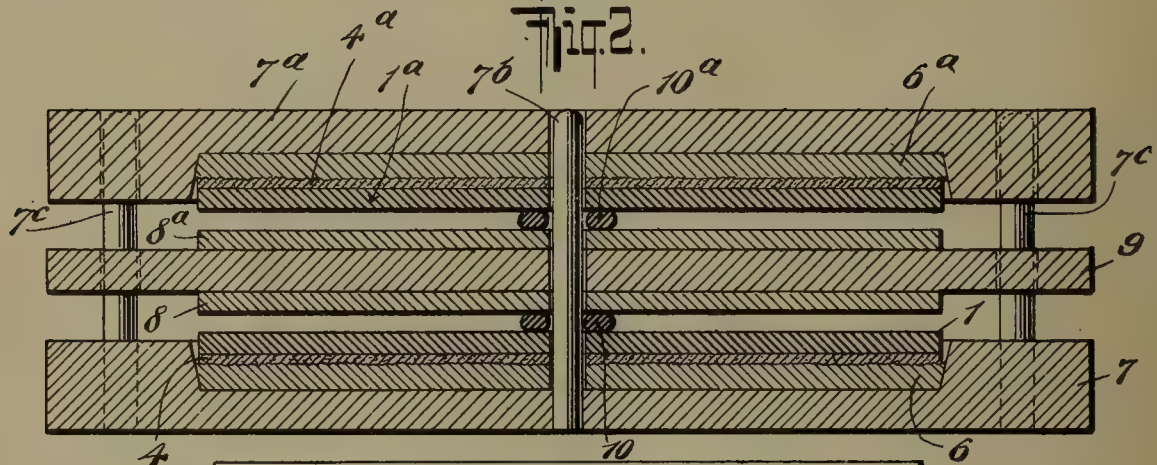


Fig. 2.

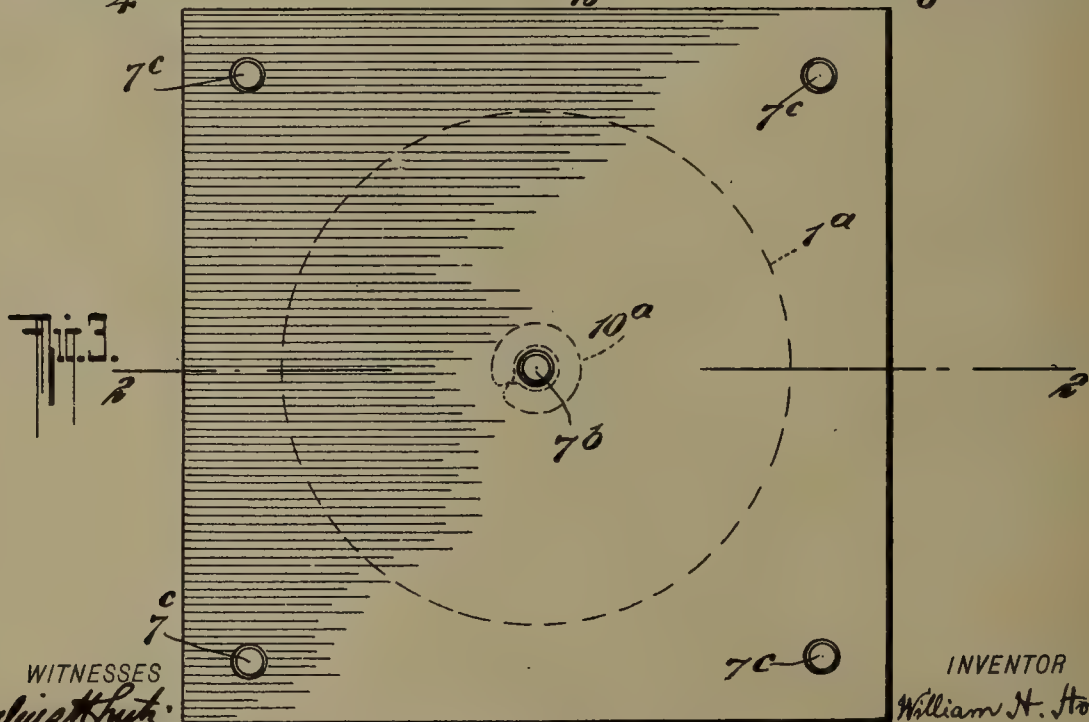


Fig. 3.

WITNESSES
Julius H. Smith
John Locke



Fig. 4.

INVENTOR
William H. Hoyt
BY *Briesen Knaut*
ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM HELM HOYT, OF WYOMING, NEW JERSEY.

METHOD OF MAKING MOLDED FLAT SOUND-RECORDS.

No. 867,975.

Specification of Letters Patent.

Patented Oct. 15, 1907.

Application filed October 17, 1906. Serial No. 339,330.

To all whom it may concern:

Be it known that I, WILLIAM HELM HOYT, a citizen of the United States, and a resident of Wyoming, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Methods of Making Molded Flat Sound-Records, of which the following is a specification.

My invention relates to methods for making molded articles and particularly molded flat sound records for talking machines and has for its object to cheapen the cost of manufacture of such articles without impairing the efficiency or wearing qualities thereof.

Reference is to be had to the accompanying drawing in which

Figure 1 is a vertical section illustrating one of the steps of my method; Fig. 2 is a vertical section showing the mold employed, at a subsequent stage of the process, the section being taken on line 2—2 of Fig. 3; Fig. 3 is a plan view of such mold; and Fig. 4 is a cross-section of part of a record made according to my invention.

In manufacturing records or other articles according to my improved method I first take a lot of stock which I will call A, and which is composed of very cheap material such as refined asphaltum or resinous material and form it into disks 1 of the required size and thickness in any convenient manner, as for instance by means of a suitable machine. Then I take a second stock which I will call B and which is composed of high-grade material and grind it into a very fine powder. As an example of a material suitable for this stock B, I will describe a body obtained by mixing and heating so as to cause them to form a coherent mass, the following ingredients:

Shellac 40 parts (by weight),
Shoddy 6 "
Asbestos 5 "
Pigment 4 "
Clays 45 "

These clays may be a mixture of barytes, china clay, pipe clay, etc. Thereupon I take a piece 2 of muslin or canvas or other suitable material and place it on a heating table 3 which may be of any customary construction. A disk 1 made of the stock A is now taken and one surface of said disk is covered with the powdered B stock, as indicated at 4. Just enough powdered B stock is used to cover the surface of the disk evenly. I now place the disk made of A stock and sprinkled with B stock on top of the muslin 2 on the table 3 (heated by a gas burner 3^a or otherwise) with the powdered side upward and cover it with a pan 5 or other suitable article to confine the heat so that the disk 1 quickly becomes soft or plastic. When the disk has become sufficiently plastic the powdered B stock and the disk of A stock become one coherent mass. While in this state, I remove the disk from the heating

table by means of the muslin or other fabric, and place it on the face of a matrix 6 in a mold 7 with the surface of the disk to which the powdered B stock was applied next to matrix face. I now remove the muslin or other fabric which is only used as a convenient means for removing the disk from the heating table, and place a plate next to the disk. This plate preferably consists of two members, the lower one of which 8 is of the same size as the disk, while the upper member 9 is much larger, being guided on pins 7^b and 7^c. The arrangement is duplicated above the plate 9 in reverse order the corresponding parts being designated by the same reference numerals with the addition of the index "a". Pressure is then applied and maintained until the record disks have become cold after which said disks are removed and are ready for use. The entire mold, that is, both matrices 6 and 6^a as well as the intermediate plate 9 and top plate 7^a are heated before the molding operation. I prefer to place some loose material such as a hot soft lump (10 or 10^a) of A stock or other plastic material on the central portion of the disk 1 before the molding pressure is applied, so that this lump may spread toward the periphery and in so doing drive out the air from between the plate 8 or 8^a and the disk. In the finished article (Fig. 4) this material forms a coating 11 on the side of the record disk 1 opposite to that coated with B stock and containing the record groove impressed by the matrix. Any suitable construction may be employed for the mold, the drawings show it provided with a centering pin 7^b and guide pins 7^c.

The grooved face of my improved record which is subjected to wear is thus composed of high-grade material, while the remainder of the record is made of comparatively cheap stock. This results in a record with the same qualities as if the entire disk were made of the best materials, while the cost of making such record is reduced to a minimum.

Two records are made simultaneously with the arrangement described, but when it is desired to make only one record, the parts above the plate 9 are omitted, and pressure is applied to said plate directly.

Old or worn records of the present kind may be used as equivalents of the disks 1 made of A stock, such old records being sprinkled with B stock and treated as above described, thus resulting in a new and better record. This also effects a big saving as by treating old records in this manner the necessity for making disks of A stock is avoided. In either case the disks (whether old records or especially made) form a foundation for the coating of powdered B stock.

Various modifications may be made without departing from the nature of my invention as defined in the claims.

It will be understood that the relative sizes of various parts, and particularly those of the sound record

layers, have been considerably exaggerated in the drawings, for the sake of clearness.

I claim

- 5 1. The herein described method of making flat molded articles, which consists in applying to the upper surface of a flat foundation which becomes plastic under the influence of heat, a layer of powdered material having like properties, heating the foundation and said layer to cause them to unite, then placing on the other surface of the
10 foundation, near the center, some loose material of the same character, and applying heat and pressure to cause said loose material to expand and expel the air, and the entire article to be molded.

2. The herein described method of making molded articles, which consists in applying to the upper surface of a foundation which becomes plastic under the influence of heat, a layer of powdered material having like properties, exposing both the foundation and the applied powdered layer to heat to cause them to unite, and thereupon transferring the entire article to a mold and subjecting it to pressure therein while hot. 15 20

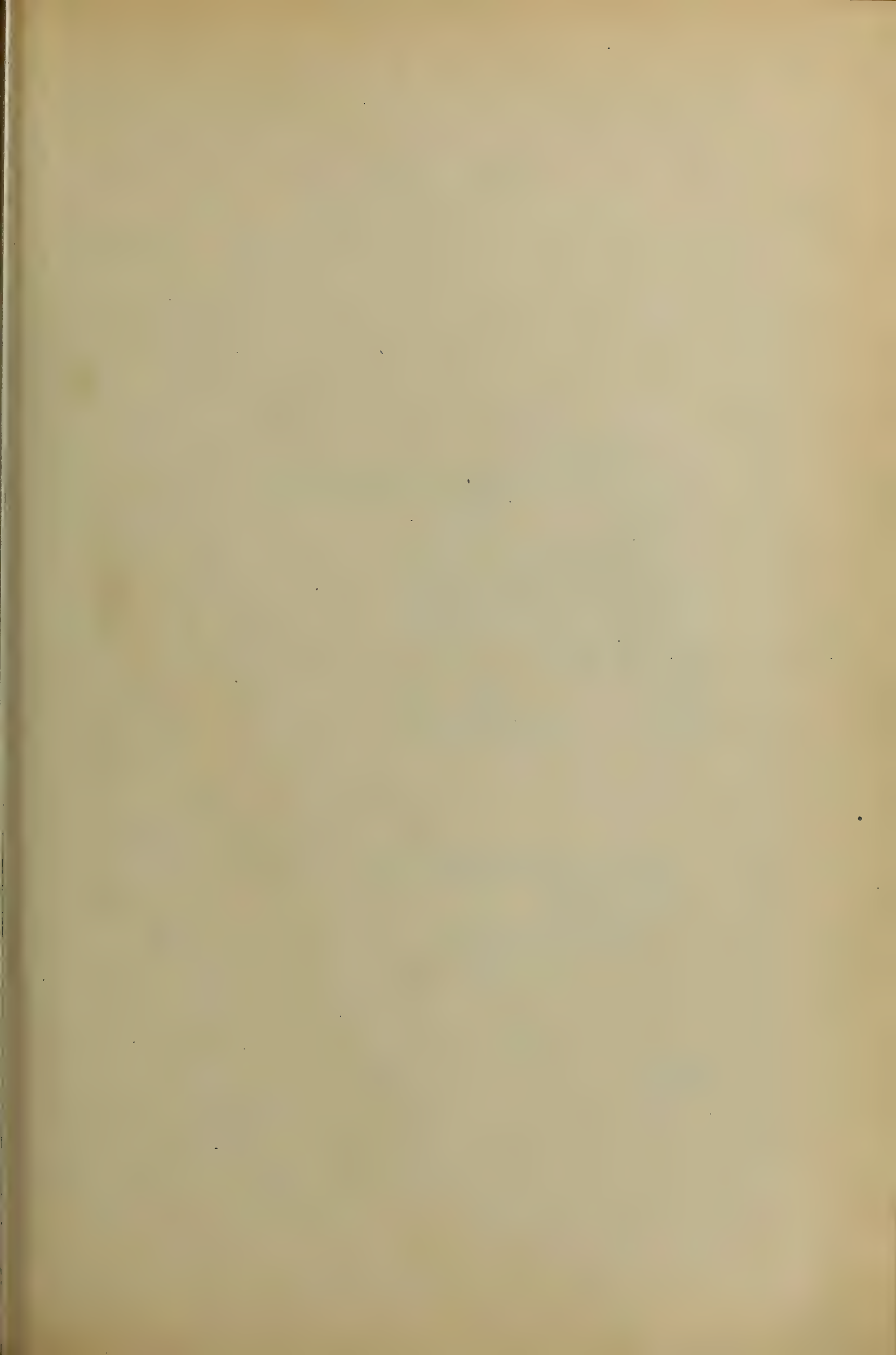
In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

WILLIAM HELM HOYT.

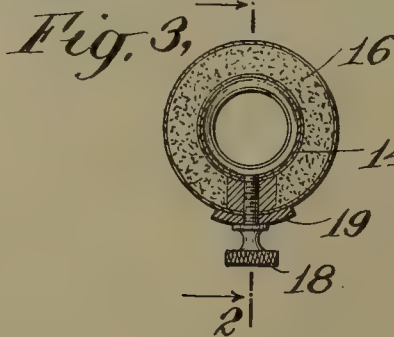
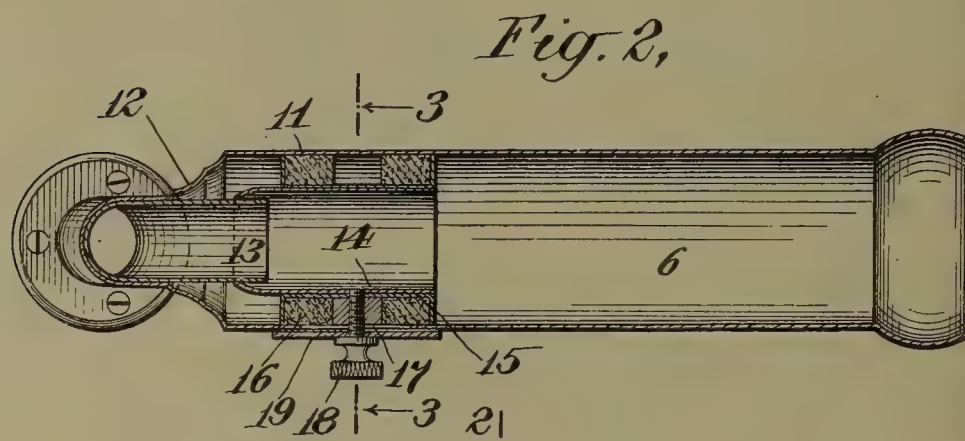
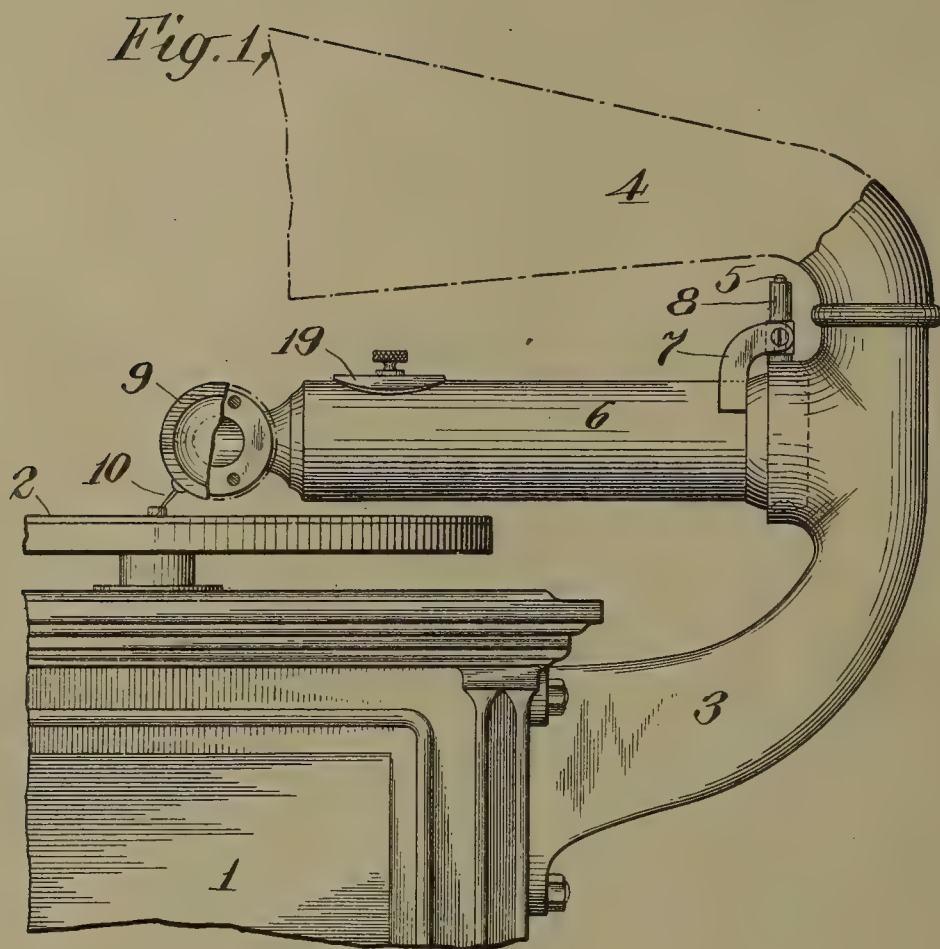
Witnesses:

JOHN LOTKA,

JOHN A. KEHLENBECK.



E. H. MOBLEY.
SOUND CONVEYING DEVICE.
APPLICATION FILED JAN. 8, 1907.



WITNESSES:

H. Edwards.
L. Smorack.

INVENTOR

Edwin H. Mobley

BY

H. Edwards
ATTORNEY

UNITED STATES PATENT OFFICE.

EDWIN H. MOBLEY, OF ARDSLEY, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

SOUND-CONVEYING DEVICE.

No. 868,612.

Specification of Letters Patent.

Patented Oct. 15, 1907.

Application filed January 8, 1907. Serial No. 351,344.

To all whom it may concern:

Be it known that I, EDWIN H. MOBLEY, a citizen of the United States, residing at Ardsley, in the county of Montgomery and State of Pennsylvania, have invented certain new and useful Improvements in Sound-Conveying Devices, of which the following is a specification.

This invention relates to sound-conveying devices and has reference, more particularly, to means whereby the sound conveyed by the device can be modified as desired as to tone, magnitude, etc.

The invention is of particular utility in connection with talking machines both in recording sounds and in reproducing the sounds recorded although the same may be used in other connections, with highly beneficial results.

It is well known that the best reproductions from records of sounds of different character can be obtained only by using mechanism specially adapted for the reproduction of the particular sound, that is, a reproducer which will give the most faithful reproduction of a record of a vocal selection would give an inferior reproduction of an orchestral or instrumental solo selection. For this reason, in order to obtain the best results it is necessary to have a number of reproducers and to use one or another according to the character of the record to be reproduced. Moreover, it has been found practically impossible to make amplifying horns and sound-boxes so near alike as to every part as to give reproductions which are the same in tone, pitch, resonance, etc. Also, in recording sounds, it frequently happens that certain tones cause what is known as "blasting" and a faithful reproduction of such a tone cannot be obtained.

The object of my invention is to provide a sound-conveying device having adjustable means therein by which the sounds conveyed by the device can be modified and their volume, tone or pitch regulated at will. In this way when the device is used to convey sounds to be recorded to a recording diaphragm and stylus, the objectionable blasting can be avoided by an adjustment of the movable parts; also, when the device is used to convey sounds reproduced, it is unnecessary to substitute one reproducer for another when changing from a record of one character to one of another, and the slight differences in sound-boxes and horns may be readily compensated for so that the most faithful reproduction of the original sounds can be obtained.

In the preferred embodiment of my invention adapted for use in connection with sound-reproducing means, I provide a body located within the sound-conveying tube leading from the reproducer and movable within

the tube so that its position determines the shape of the interior of the tube, adjusting devices being provided whereby this body can be moved to and locked in the desired position from outside the tube. By means of such an adjustable modifier not only can the pitch of the reproduced sound be regulated but also its character can be changed from one which is rather hollow and resonant to one which is much more sharp.

The preferred embodiment of my invention as used for reproducing sound from a disk-record is illustrated in the accompanying drawings in which

Figure 1 is an elevation of a portion of a talking machine, Fig. 2 is a longitudinal section of the tone-arm thereof, inverted to better illustrate its shape, the section being on line 2—2 of Fig. 3, and Fig. 3 is a transverse section on line 3—3 of Fig. 2.

Referring to the drawings, 1 indicates the motor-box of a talking machine having a motor therein driving a vertical shaft on which the disk-shaped record 2 is mounted. Secured to the side of the box is a coupling member 3 having an opening through the upper portion thereof. A tapering amplifying horn 4 is adapted to be mounted on the upper end of the member 3, its opening communicating with the opening in the coupling member. Secured on the coupling near the other end of the opening therethrough is a pin 5 on which is supported the tone-arm 6. For this purpose the tone-arm has a yoke 7 secured thereto on the arms of which is horizontally pivoted a cross-head carrying a sleeve 8 adapted to fit over the pin 5. The end of the tone-arm is arranged to telescope slightly with the coupling member 3 as shown in Fig. 1. To the other end of the tone-arm is secured the sound-box 9 having a needle 10 bearing in the groove in the record disk.

The construction of the tone-arm may be varied somewhat depending on the construction of the machine with which it is used. It is here shown as a cylindrical sheet metal tube 11 having one end contracted at 12 to a considerably less diameter, and this small end bent to a ninety degree curve and having the sound-box secured to its end. Fitting tightly within the small end of the tube is a curved tube 13, one end thereof alining with the end of the tube 11 and the other end extending a considerable distance within the larger cylindrical portion 11. The tubes 11 and 13 constituting the tone-arm thus form two overlapping sections, preferably of circular cross-section and one of larger diameter than the other.

Within the section 11 is located the sound-modifying device consisting of an annular member movable axially of the section. This device may be formed of a tube 14, a sleeve 15 thereon having integral outwardly-turned flanges at its ends and gaskets 16 on this sleeve.

To provide for movement of the device, I provide a slot 17 in the tone-arm and a set-screw 18 extending through this slot and into a threaded opening in sleeve 15 and tube 14. Preferably a slide 19 is provided between the head of the screw 18 and tube 11 to close and conceal slot 17.

The interior diameter of the modifying device may be substantially the same as the exterior diameter of the tube 13 so that movement of the modifier serves to extend the smaller section of the tone-arm. Or, if desired, the interior of the modifier may be of a diameter greater than the exterior diameter of tube 13 but of less diameter than the tube 11 so that the modifier constitutes a third section of the tone-arm, the three sections being of progressively increasing diameter. In the latter case, the end of tube 14 toward the sound-box is contracted to closely encircle tube 13. Since the end of the tube 13 extends into the tube 11 the modifier can be moved over it a short distance to telescope therewith.

By adjusting the modifier along the tone-arm the character of the sound of the reproduction can be varied as desired, thus making it possible to obtain a reproduction approaching very closely the sound recorded. The movement of the modifier serves to change the relative lengths of the two sections of the tone-arm or to increase or decrease the length of a third section of a size between the other two sections. By increasing the length of the section 13 the movement of the modifier can be made to insert or eliminate the third section of intermediate size. With the construction illustrated, movement of the modifier to the right in Fig. 1 makes the sound more hollow and movement to the left makes it more sharp.

Having described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. A sound-conveying device comprising a tube having two sections therein, one of greater size than the other and a tubular sound-modifier located within said tube with its walls lying close to the walls thereof and movable to increase or decrease the effective length of one of said sections, substantially as described.

2. A sound-conveying device comprising a tube having two cylindrical sections therein, one of greater diameter than the other and an annular sound-modifier located within said tube and movable to increase or decrease the effective length of one of said sections, substantially as described.

3. A sound-conveying device comprising a tube having two sections therein, one of greater size than the other, and a sound-modifier movable within said larger section

adjacent to the end of the smaller, substantially as described.

4. A sound-conveying device comprising a tube having two sections therein, one of greater size than the other, and a sound-modifier located within said larger section and movable therein adjacent to the end of the smaller section to increase or decrease the effective length of the smaller section, substantially as described.

5. A sound-conveying device comprising a tube having two over-lapping sections therein one of greater size than the other and an annular sound-modifier movable within said larger section and adapted to have the end of said smaller section telescope therewith, substantially as described.

6. A sound-conveying device comprising a tube having two sections therein one of greater size than the other, a sound-modifier located within said tube, and means operated from outside the tube for moving said device to increase and decrease the effective length of one of said sections, substantially as described.

7. A sound-conveying device comprising a tube having two cylindrical sections therein one of greater diameter than the other, an annular sound-modifier located within said larger section and a set-screw extending through a slot in the wall of said larger section and into said modifier, substantially as described.

8. A sound-conveying device comprising a tube having two overlapping sections therein one of larger diameter than the other, an annular sound-modifier movable within said larger section adjacent to the end of the smaller section and adapted to telescope with the end of the smaller section, and a set-screw extending through a slot in the wall of the larger section and into said modifier, substantially as described.

9. A sound-conveying device comprising a tube, a tubular member located wholly within the walls of the tube and having an imperforate wall, said member being of substantially uniform, internal and external, effective diameter, and means for moving said member axially of said tube from outside the tube, substantially as described.

10. A sound-conveying device comprising a tube, a tubular member of substantially uniform, internal and external, effective diameter located wholly within the walls of the tube, its walls lying close to the walls of the tube, and means outside the tube for moving said member axially of the tube, substantially as described.

11. In a talking machine, a tone-arm, a sound-box secured to one end thereof, a tubular member fitting snugly within the tone-arm, and means for moving the member axially thereof from outside the tone-arm, substantially as described.

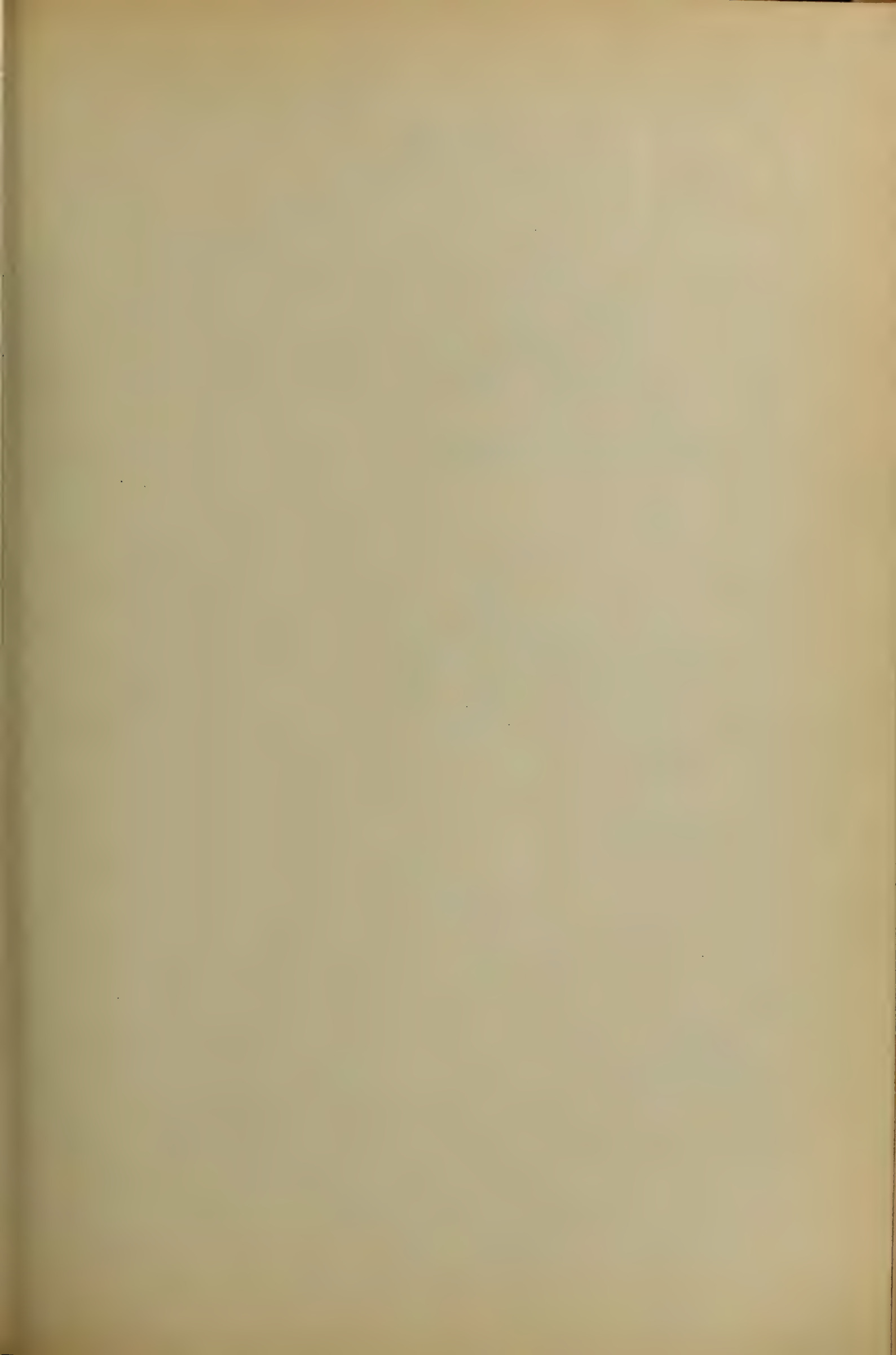
12. In a talking machine, a tone-arm having two portions, one of greater size than the other, a sound-box secured to the end of the smaller portion, and an annular member movable axially within the larger portion, substantially as described.

This specification signed and witnessed this 2 day of January, 1907.

EDWIN H. MOBLEY.

Witnesses:

H. MEIER,
R. FROST.



UNITED STATES PATENT OFFICE.

ROBERT L. GIBSON, OF PHILADELPHIA, PENNSYLVANIA.

SOUND-REPRODUCING MACHINE.

No. 868,771.

Specification of Letters Patent.

Patented Oct. 22, 1907.

Application filed October 31, 1906. Serial No. 341,393.

To all whom it may concern:

Be it known that I, ROBERT L. GIBSON, of the city and county of Philadelphia, State of Pennsylvania, have invented an Improvement in Sound-Reproducing Machines, of which the following is a specification.

My invention has reference to sound reproducing machines and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings which form part thereof.

The object of my invention is to provide a sound reproducing machine which shall cause a forced current of air to be put into sonorous vibration under the application of a reed or reeds and a control valve which is vibrated by the stylus, in turn put into a state of vibration by the traveling record tablet.

Heretofore sound has been reproduced by causing a blast of air to be forced through the amplifier or horn, and during its passage interrupting the uniformity of its flow by the action of a valve vibrated by the stylus. The objection experienced by this type of machine has been that the sonorous sound necessitates a continuous flow of the air through the valve in large volume and thereby consumes a large amount of air. As the air has to be forced by a motor, the great quantity of air required to flow through the open valve structure makes the machine expensive to operate and costly to make on account of the size and strength of the motor and blower required.

More specifically, my object is to reduce the quantity of air necessary for circulation and thereby reduce the cost of operation. My object is further to reduce the cost of the machine and at the same time produce a more sonorous and pleasing tone to the sounds emitted.

In carrying out my invention, I provide a continuous air passage from a blower to the horn or amplifier, and in said passage I interpose a reed or reeds free to vibrate and also a valve controlled by the record tablet through the stylus, which valve controls the pulsations of air passing to the reed or reeds in accordance with the amplitude of the vibration of the stylus.

My invention also comprehends details of construction which, together with the features above specified, will be better understood by reference to the accompanying drawings in which:

Figure 1 is a sectional elevation of a sound reproducing mechanism embodying my invention; Fig. 2 is a transverse section on line 2—2; and Fig. 3 is a plan view of the reed portion removed showing a multiple reed arrangement.

A is the air tube on which is usually the swinging tubular arm and connects with the horn or amplifier in the ordinary way. The end of this arm has a head containing a balanced valve E which is arranged between the heads F F. The valve disks and heads

have apertures or slots *e* and *f* respectively to control the passage of air.

Between the heads F F is a chamber K in which the valve oscillates and this is supplied with air under pressure by a pipe leading from any suitable source of air such as a blower. The chamber L on one side of one of the heads F communicates with the chamber M on the opposite side of the other of the heads by the passageway N or otherwise as desired.

The valve has an oblique shaft P journaled in the head and is provided on the outside with a needle or style clamp H which holds the needle or point I. This point of the stylus traverses the groove of the record tablet J and is thereby vibrated and transmits such vibrations to the valve E which permits greater or less air to pass through the apertures *e f* in accordance with the amplitude of the vibrations of the stylus.

The air passes through the valve in puffs of greater or less strength and is received in the air chamber L of the tube A and from this as a receiver the air flows through a reed or reeds C to the horn or amplifier (not shown). The reed structure consists of a perforated partition or wall D, preferably obliquely across the tube and the perforations B are covered with the reeds secured at one end. The reeds may be one or more in number, Fig. 3 indicating several. If desired, these reeds may be different so that the timbre or tone may be varied in different instruments which will impart a more sonorous or rich effect to the sound. The vibration of the reed while giving the richness to the tone and also sustains the sound, the real cause for difference in rate of vibration is the valve, and the difference in rate of vibration is commensurate with the vibrations of the stylus. By this construction I am enabled to employ a closely fitting valve and hence avoid objectionable leak of air and consequently operate the instrument with less power and expense.

I do not restrict myself to the details of construction herein set out as they may be changed or modified to suit any particular design of machine to which the improvements are applied.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a sound reproducing machine, a tube for the passage of a current of air under pressure, combined with a valve to control the flow of air, a stylus to operate the valve, and a reed through which the air escapes after leaving the valve.

2. In a sound reproducing machine, a tube for the passage of a current of air under pressure, combined with a valve to control the flow of air, a stylus to operate the valve, and a reed structure comprising a plurality of reeds through which the air escapes after leaving the valve.

3. In a sound reproducing machine, a tube for the passage of a current of air under pressure, combined with a valve to control the flow of air, a stylus to operate the valve, and a reed structure comprising a plurality of reeds of different rates of vibration through which the air escapes after leaving the valve.

4. In a sound reproducing machine, a tube through which a current of air is forced under pressure, a closely fitting balanced valve, a stylus to move the valve, and a reed structure through which the air is caused to pass after leaving the valve and before it escapes to the atmosphere.

5. In a sound reproducing machine, a tube for the passage of a current of air under pressure, combined with a valve to control the flow of air, a stylus to operate the valve, a reed through which the air escapes after leaving the valve, and an air chamber between the reed and valve.

6. In a sound reproducing machine, a tube through which a current of air is forced under pressure, a valve to cause the air to flow in variable blasts, a stylus to control the valve, and means for producing a vibration of the air after it leaves the valve.

7. In a sound reproducing machine, a tube through which a current of air is forced under pressure, a valve to cause the air to flow in variable blasts, a stylus to control the valve, mechanical means for producing a vibration of the air after it leaves the valve, and an air chamber between the valve and mechanical means.

8. The method of reproducing sound which consists in

creating a forced current of air, interrupting said current of air in the form of blasts in accord with sound articulations, and causing said blasts of air to take on a sonorous tone by passing in contact with and vibrating a reed.

9. The method of reproducing sound which consists in creating a forced current of air, interrupting said current of air in the form of blasts of variable strength and duration in accord with sound articulations, and causing said blasts of air to take on a sonorous tone by impressing upon them a predetermined rate of vibration.

10. The method of reproducing sonorous sounds which consists in producing impulses in a current of air in accordance with the sound articulations to be reproduced and changing the character of the tone by impressing upon said impulses of air vibrations of a predetermined fixed rate.

In testimony of which invention, I hereunto set my hand.

ROBERT L. GIBSON.

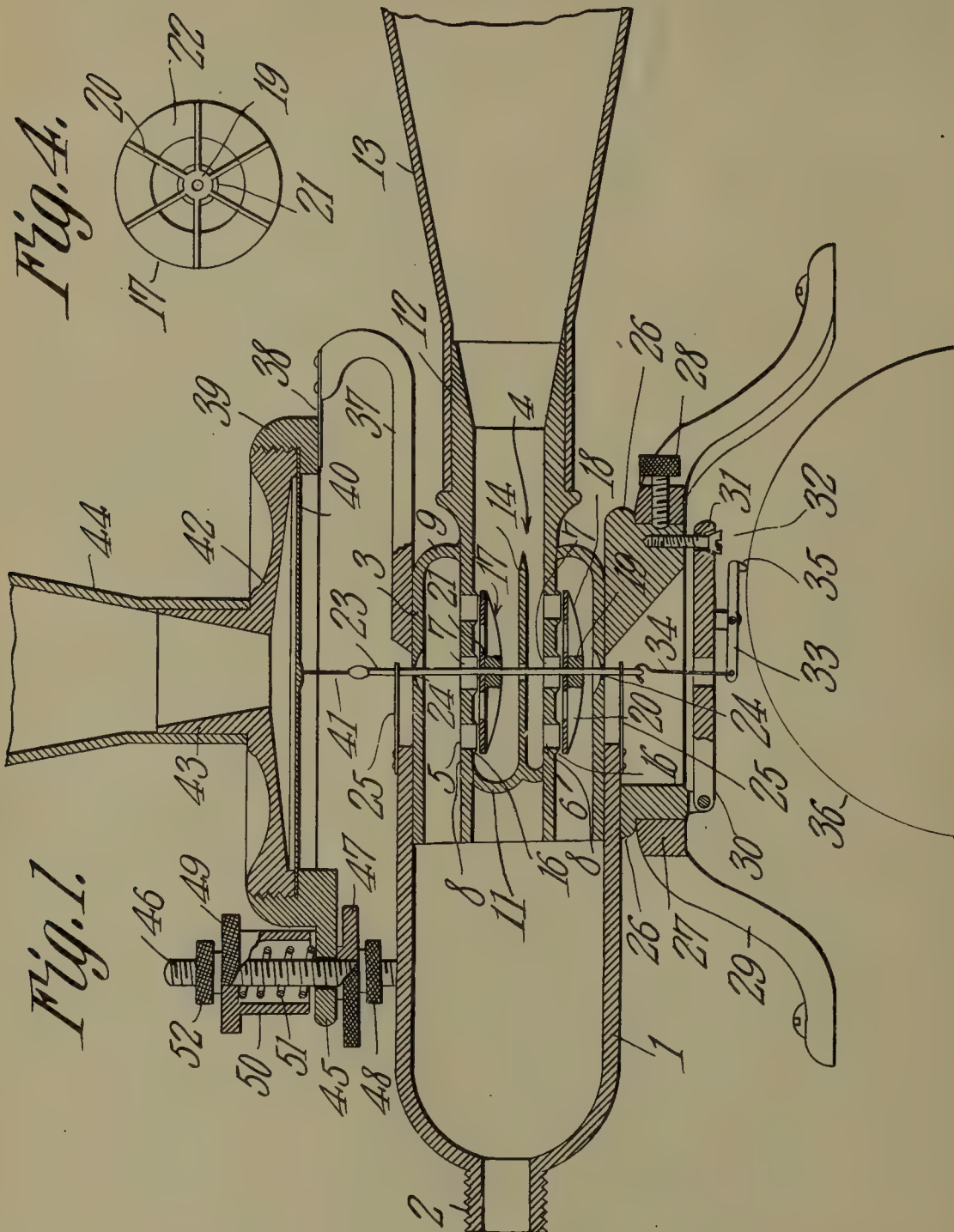
Witnesses:

R. M. KELLY,

M. F. DRISCOLL.

N. BALDWIN.
SOUND AMPLIFIER.
APPLICATION FILED JUNE 21, 1907.

3 SHEETS—SHEET 1.

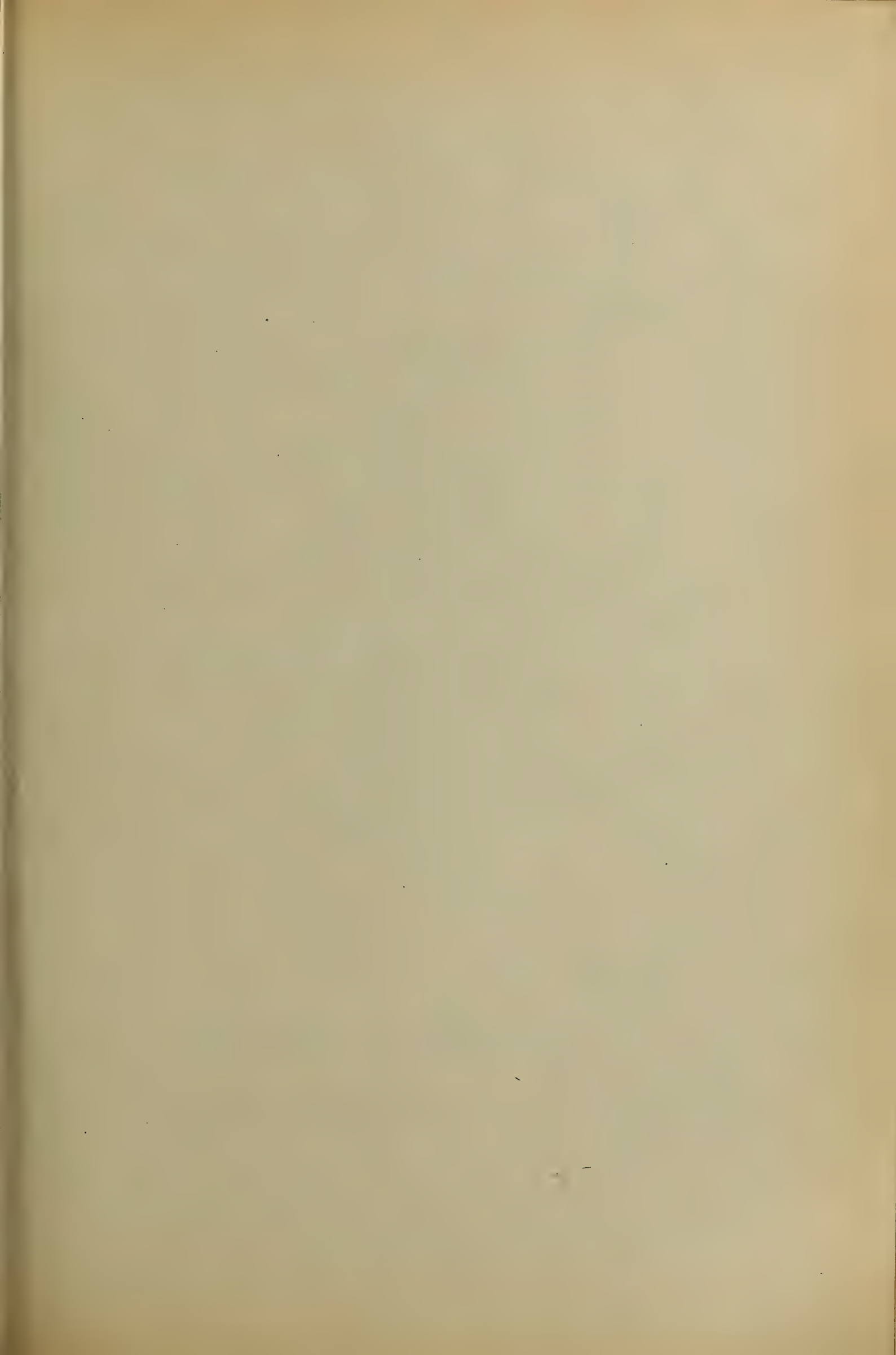


Nathaniel Baldwin,
INVENTOR.

WITNESSES:

E. J. Stewart
F. T. Chapman

By *C. A. Snow & Co.*
ATTORNEYS



N. BALDWIN.
SOUND AMPLIFIER.
APPLICATION FILED JUNE 21, 1907.

3 SHEETS—SHEET 2.

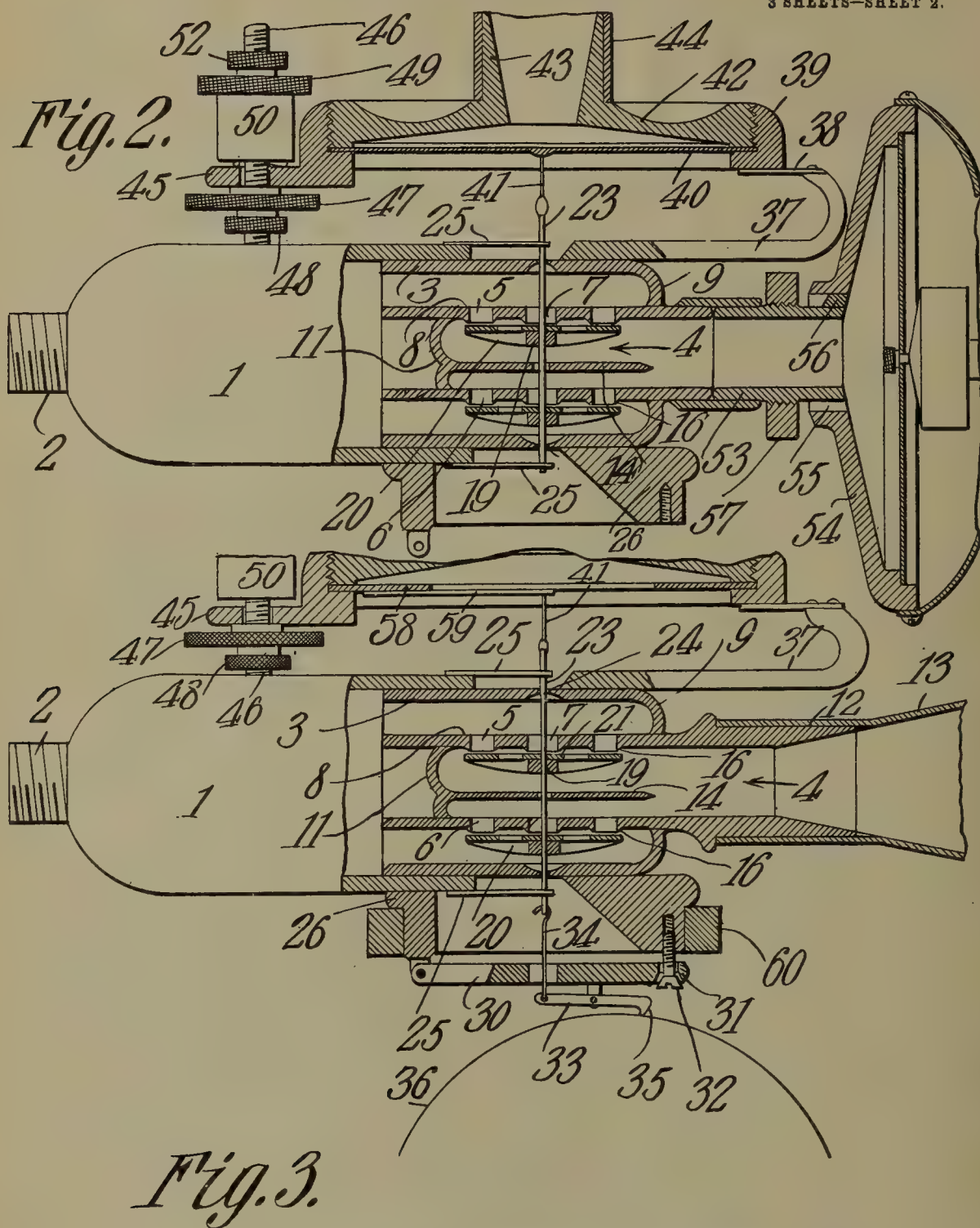


Fig. 3.

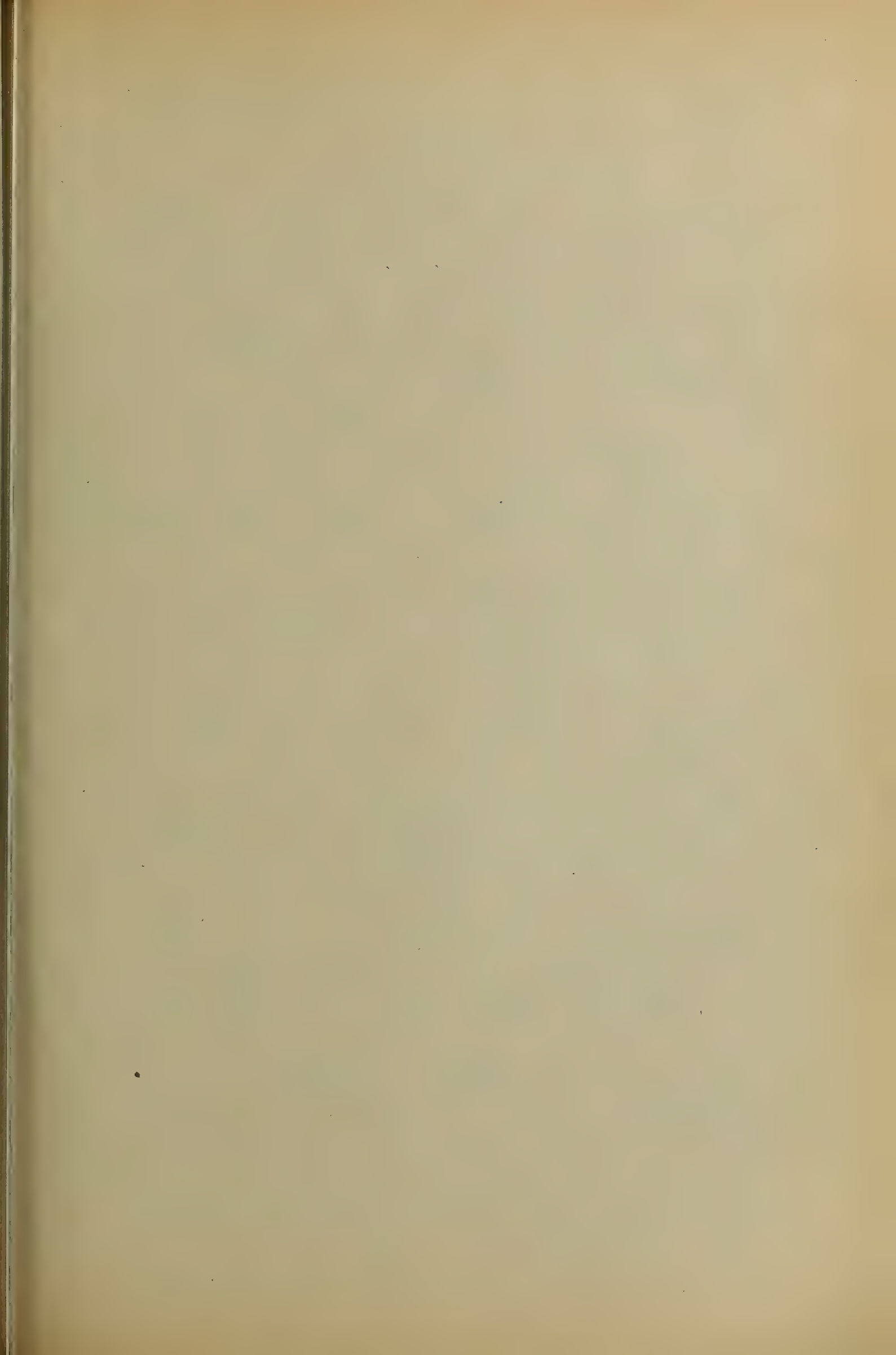
Nathaniel Baldwin,

INVENTOR.

WITNESSES:

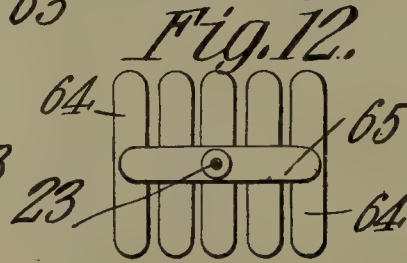
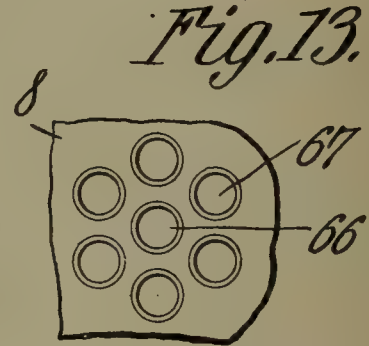
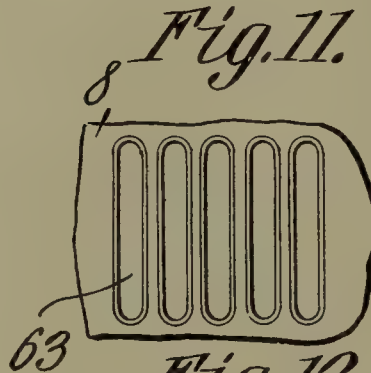
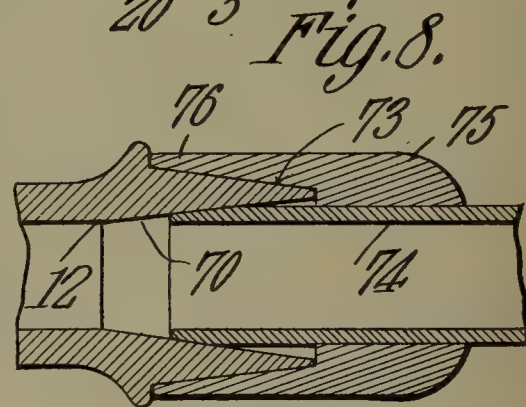
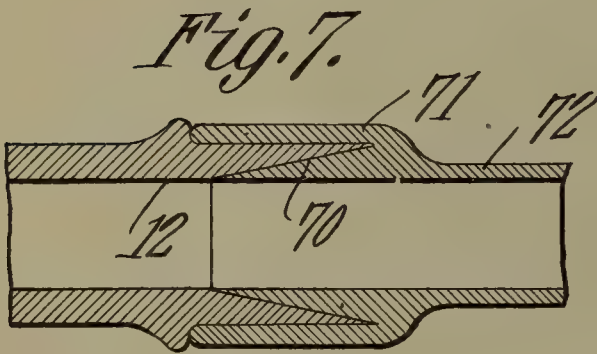
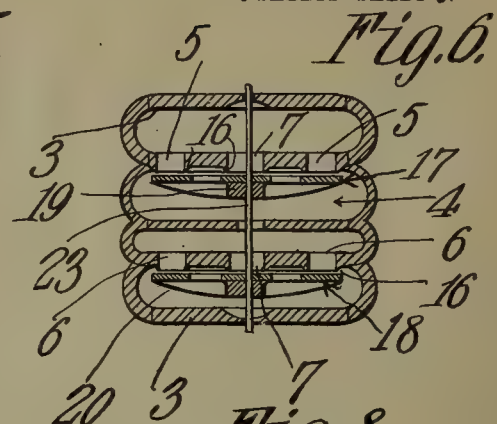
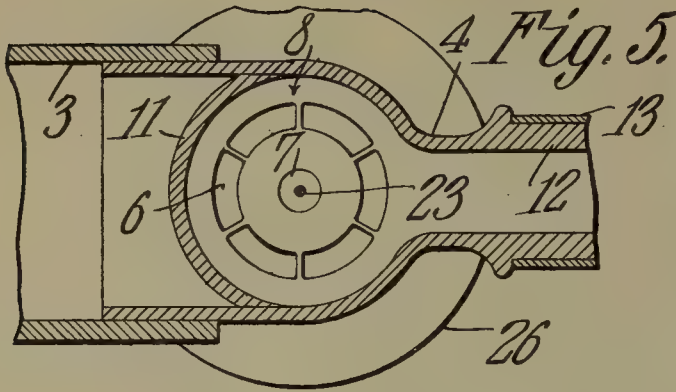
E. C. Stewart
F. J. Chapman

By C. A. Snow & Co.
ATTORNEYS



N. BALDWIN.
SOUND AMPLIFIER.
APPLICATION FILED JUNE 21, 1907.

3 SHEETS—SHEET 3.



WITNESSES:

E. J. [Signature]
H. J. Chapman.

Nathaniel Baldwin, INVENTOR.

By *C. A. Snow & Co.*

ATTORNEYS

UNITED STATES PATENT OFFICE.

NATHANIEL BALDWIN, OF HEBER, UTAH.

SOUND-AMPLIFIER.

No. 869,288.

Specification of Letters Patent.

Patented Oct. 29, 1907.

Application filed June 21, 1907. Serial No. 380,145.

To all whom it may concern:

Be it known that I, NATHANIEL BALDWIN, a citizen of the United States, residing at Heber, in the county of Wasatch and State of Utah, have invented a new and useful Sound-Amplifier, of which the following is a specification.

This invention has reference to improvements in sound amplifiers of the type wherein the flow of a stream of fluid under pressure is modified by and in accordance with sound waves either produced directly by the original source of sound, or through the intermediary of a record of sounds, or through sound produced telephonically.

The invention is applicable as a telephone relay, whereby sounds weakly reproduced by a telephone receiver are greatly magnified or intensified or amplified and are then caused to act upon a telephonic transmitter, to be again reproduced by a suitable telephonic receiver at a distant point.

The invention is also applicable for the intensified and magnified reproduction of recorded sounds without appreciable loss of purity or quality of tone and with greatly increased volume. And the invention is likewise applicable for the megaphonic production of sounds of largely increased volume over and above the original source.

The invention is also adapted to the recording of sounds by greatly augmenting the sounds, which may then be recorded in the ordinary manner.

The invention comprises a valve interposed in the path of a stream of fluid under pressure, whether the same be air, or steam, or any other suitable fluid, of which air may be taken as an example, and this valve is so mounted as to be balanced in said air stream and thus offer no resistance except that of its own inertia to the forces tending to move the valve, which forces are in the form of sound waves whether produced directly from the original source, or through the intermediary of a sound record, or by a telephonic receiver. In fact, the valve may be operated by a direct connection to a suitable armature placed opposite the poles of a properly constructed telephonic receiver, so that the direct action of the sound waves may be entirely eliminated.

The invention comprises in addition to such a balanced valve other means necessary for the adaptation of such valve to the several purposes stated, and in order that the invention may be fully understood these various structures will be described in detail with reference to the accompanying drawings, forming a part of this specification, in which,—

Figure 1 is a sectional view through one form of the structure; Fig. 2 is a similar section, with parts in elevation, through another form of the structure; Fig. 3 is a view similar to that shown in Fig. 2, but illustrating

a somewhat different type of structure from that shown in Fig. 2; Fig. 4 is a detail view of one of the valves; Fig. 5 is a horizontal longitudinal section through the air valve mechanism; Fig. 6 is a cross section through the same; Figs. 7 and 8 are modified forms of connection for the air and sound duct leading away from the valve; and Figs. 9 to 14 are modified forms of valves and valve seats.

There is shown in Fig. 1 a structure provided with means for reproducing recorded sounds with greatly enlarged volume, but the same structure may be used for other purposes, as will appear further on. There is shown a casing 1 having one end reduced and terminating in a threaded nipple 2 where there may be attached a pipe coming from a source of compressed fluid supply, such, for instance, as a reservoir of compressed air. While steam and other fluids under pressure may be used in connection with the present invention, for the sake of simplicity of description reference will be made hereinafter only to compressed air, with the understanding that such reference is to embrace any suitable fluid under pressure.

The casing 1 is open at the end remote from the nipple 2 and there receives another casing 3 fitting snugly into the casing 1, to which it may be secured in any suitable manner. This casing 3 contains a central chamber 4 on opposite walls of which are formed annular ports 5—6 and central to each of these ports another port 7. The annulus surrounding the port 7 is supported by suitable bridge pieces, as shown in Fig. 5. The walls 8 of the chamber 4 containing the ports, 5, 6 and 7 are suitably flattened so that the ports lie in true planes. That end of the casing 3 facing the nipple 2 of the casing 1 is open, as indicated, while the other end between the outer walls of the casing 3 and the chamber 4 is closed, as indicated at 9. The chamber 4 extends to a point about coincident with the open end of the casing 3 and there is closed by a wall 11, or otherwise, while the other end of the chamber 4 is continued beyond the end wall 9 and is ultimately formed into a cylindrical neck 12 for the reception of an amplifying horn 13, which may be of the ordinary type used in sound reproducing machines. All the corners of the chamber 4 are rounded so that there may be no sharp angles to give rise to hissing and other disturbing sounds.

Between the walls 8—8 of the chamber 4 is a longitudinal deflector plate 14 suitably mounted in the end wall 15. The purpose of this deflector plate will appear further on.

On the inner face of the wall 8 through which the port 5 and its corresponding port 7 extend and surrounding both of these ports are formed ribs 16 terminating in practically sharp edges, and on the outer face of the wall 8 through which the port 6 and its corresponding port 7

extend, and surrounding both of these ports, are other similar ribs 16, likewise terminating in sharp edges. These ribs 16 have their edges carefully machined to true planes, and adjacent to these ribs are mounted two valves 17—18, each composed of a central hub 19 from which radiate arms 20. The hub 19 carries a disk 21, and the arms 20 carry at their outer ends an annulus 22. The disk 21 and the annulus 22 constitute the valve faces, while the ribs 16 constitute valve seats. The disk 21 is of sufficient size to cover the port 7, while the annulus 22 is of sufficient size to bridge the distance between the ribs 16 and the corresponding port 5 or 6.

In order that the valve seats may be properly turned or machined, the several walls of the chamber 4 may be made of separate pieces, afterward soldered or brazed together or otherwise joined.

The two valves 17 and 18 are mounted upon a valve rod 23 extending centrally through the two ports 7 and also through a small perforation in the plate 14. This rod 23 likewise extends through small perforations 24 in the outer walls of the cylinder 3. The valve rod 23 is carried near each end exterior to the cylinder 3 by springs 25—25 fast at one end on the casing 1.

Assuming, now, that the valves 17 and 18 are so adjusted, in a manner to be hereinafter described, that they are in proper relation to the ports 5, 6 and 7 and are equally distant from those ports but actually in very close relation thereto. A stream of air under pressure entering the casing 1 will flow through the ports 5 and 7 upon the valve 17, tending to force the same away from the corresponding ribs 16. At the same time the compressed air will tend to force the valve 18 against the ribs 16 surrounding the ports 6 and 7. There is therefore created a balance of pressure on these two valves and they will remain in indifferent positions with relation to the ports 5, 6 and 7 because of the equalized pressure and their fixed connection through the rod 23. Now, let it be assumed that the valve rod 23 is moved longitudinally in a direction to close the valves; it will be seen that the passage of air through the ports 5, 6 and 7 will be throttled to an extent commensurate with the closure of the valves. Now, again, suppose that the valve rod 23 is moved in a direction to move the valves away from their seats: it will, of course, be seen that there is a freer passage for the air through the ports 5, 6 and 7. During this time, the air pressure being equally distributed in a manner to tend to actuate the valves in opposite directions, the air pressure will have no effect whatever upon these valves to either open or close them, and, therefore, any force acting upon the rod 23 will meet no resistance except the inertia due to the weight of these valves, and this may be very small. If, now, the valve rod 23 receives impulses corresponding to sound wave vibrations, the valves 17 and 18 will participate in such vibration and will only offer such resistance as their weight may impose.

When the valves are actuated by sound vibrations the air stream flowing through the ports 5, 6 and 7 will be varied in accordance with these vibrations with the result that sounds corresponding in the minutest particular to the vibrations imparted to the valves 17 and 18 will be produced, but with an intensity commensurate with the air pressure. Thus it is quite possible to produce from weak sounds or sound records where the recorded waves are of little amplitude, or from

greatly attenuated electric impulses received telephonically, a volume of sound exceeding in intensity the original sound produced.

The casing 1 and casing 3 are supported upon an annulus 26, suitably shaped for the purpose, and this annulus may be carried by a ring 27 secured to the annulus by a set or thumb-screw 28 and provided with legs 29 fast to a fixed structure (not shown), or it may be seated in the carriage of a phonographic reproducing machine, as will hereinafter appear. Pivotaly secured at one end to the annulus 26 is an arm 30, the other end of which is provided with a perforation 31 for the passage of a screw 32 engaging a nut formed in the annulus 26, so that the said arm may have a limited play to and from the annulus but may not move away therefrom to too great an extent. Secured to the arm 30 is a lever 33 connected at one end by a link 34 to the corresponding end of the valve rod 23, and at the other end carrying a reproducing stylus or jewel 35 arranged in operative relation to a cylinder 36 from which the record may be reproduced.

Secured to the casing 3 diametrically opposite the annulus 26 is a bracket 37 carrying one end of a spring 38, the other end of which is attached to a ring 39 in which is seated a diaphragm 40 attached to the valve rod 23 by a link 41 at the end of the valve rod remote from the point of connection therewith of the link 34. The connection between the link 41 and rod 23 may be a soldered connection, so that there may be no lost motion at this point but still the rod and link may be easily disconnected when desired, by simply melting the solder. The diaphragm 40 is secured in the ring 39 by a follower 42 screwed into said ring, and this follower 42 is provided with a neck 43 receiving the small end of a horn 44, similar to the horns used on sound reproducing machines.

If it be desired to utter sounds into the horn 44 and have the same greatly augmented through the horn 13, it is then only necessary to introduce compressed air into the casing 1, when the several operations noted will be performed. If it is simply desirable to produce a megaphonic effect of sounds uttered into the horn 44, the cylinder 36 may be omitted and the stylus 35 and parts connected therewith up to the valve rod 23 are then disconnected, the link 34 being easily removed from the lower end of the rod 23 into which it is simply hooked. By this means a person speaking in an ordinary tone of voice may have his speech so magnified as to be heard at great distances far exceeding the range of an ordinary megaphone.

In order to provide a delicate adjustment for the valves 17 and 18 the ring 39 is provided on the side opposite the spring 38 with an ear 45 through which extends a screw-threaded post 46 rising from the casing 1. Between the ear 45 and the casing 1 the post 46 carries an adjusting nut 47 back of which is a clamp nut 48, and on the side of the ear 45 away from the nut 47 the post 46 carries another adjusting nut 49 provided on one side with a sleeve 50 within which is a spring 51 bearing at one end against the ear 45 and at the other end against the adjusting nut 49. There is also provided a clamp nut 52 for the adjusting nut 49. By suitably manipulating the nuts 47 and 49 the ring 39 may be adjusted in such manner as to move the valves 17 and 18 to or from the seats formed by the ribs 16, and this adjustment

may be performed with great delicacy, due to the large size of the adjusting nuts and the long leverage between the spring 38 and the ear 45. This is by no means the only form of adjustment that may be used, for other adjusting means may be provided if found to be of sufficient delicacy for the purpose.

If the air streams flowing through the ports 5 and 6 and their corresponding ports 7 should enter the chamber 4 in opposite directions, there would be a likelihood of interference and the unbalancing of the two valves by the incoming air stream striking the back of the valve 17. In order to avoid this the deflector 14 is provided, so that these air streams are diverted toward the mouth of the chamber 4 without any possibility of the stream entering through the port 6 striking the valve 17 and thus tending to cause the closure of the valves.

Referring now, to Fig. 2, the structure therein shown is similar in most respects to that shown in Fig. 1, but the connections for reproducing recorded sounds are omitted and the amplifier 13 is also omitted. In the structure shown in this figure the chamber 4 communicates directly with a neck 53 carried by the casing of a microphonic transmitter 54 of known construction, the neck 53 taking the place of the ordinary mouthpiece of such microphone. There is this difference, however, that the neck 53 is smaller than the opening in the cap of the casing 54, so that there is an annular opening 55 from the interior of the casing of the microphone 54 to the exterior thereof, while bridge pieces 56, suitably disposed, serve to center the neck 53 in the opening 55. A nut 57 serves to modify the open end of the passage 55 as may be desired.

Now, by screwing into the ring 39 an ordinary telephone receiver with the cap removed therefrom and the telephone-receiver diaphragm connected to the rod 23 by a link 41, electric impulses corresponding to sound waves coming over the line, even if greatly attenuated, will be sufficient to actuate the valves 17 and 18 so as to modify the air current entering the casing 3 and thus cause sounds of greatly magnified intensity to impinge upon the diaphragm of the transmitter 54, to be thereby transmitted to great distances. This provides a form of telephone relay of practical utility. By using a speaking diaphragm 40 with cap 42 and mouthpiece 44, all as shown in Fig. 2, the instrument is adapted to increase the power of the telephone transmitter, and this is an important adaptation of the invention.

In Fig. 3 the structure is similar to that shown in Fig. 1, except that the diaphragm 40 is replaced by an annulus 58 carrying a spring arm 59, radially disposed and connected by a link 41 to the rod 23. The structure shown in this figure is particularly adapted for the reproduction of recorded sounds with greatly augmented volume, and in this case the annulus 26 may be seated in the carriage of a phonographic reproducing machine. This carriage is conventionally represented at 60.

There are other adaptations of the invention which are not shown and need not be specifically mentioned, it being understood that the invention is adapted to be used in any connection where it is desirable to augment sounds, either as originally produced, or as transmitted through the instrumentalities comprised in the invention, or reproduced from a suitable record.

With the present invention several sound-augmenting mechanisms may be used in tandem, so that the

augmented sound from one instrumentality may be caused to act upon the valve of the next one in order to correspondingly increase its amplitude of vibration, and so on through as many valves as may be desired. By this means it is possible to replace steam whistles or other signals by a series of two or three or more valves operated upon one by the other in order until the final resultant sound is many times the volume of the original sound. For this purpose the chamber 4 of one instrument such as shown in Fig. 1 may be connected directly to the neck 43 of the next instrument, and the chamber 4 of the second instrument to the neck 43 of the third instrument, and so on, with, if need be, increasing air pressure in the casing 1 of each succeeding instrument.

It may be noted that the sum of the circumferences of the ribs 16 will be great as compared with the dimensions of the valves; consequently, when a high air pressure is used slight movements of the valves will make a great change in the amount of air which passes through the ports. There is thus produced a resultant sound many times louder than would be produced by the original sound or the vibrations corresponding to sound waves.

It is also within the scope of the present invention to use the telephone receiver as described with reference to Fig. 2, and omit the stylus 35 and the parts directly coacting therewith, so that impulses telephonically received may be converted by the action of the compressed air and the valves, into sounds of greatly augmented volume which may be emitted through the horn 13 and be distinctly audible to large audiences.

If, in the structure shown in Fig. 2, the telephonic transmitter 54 be replaced by a phonographic recorder, a much greater amplitude of vibration, and, consequently, a much more pronounced record of the sounds will be made, or, because of the greater force acting upon the diaphragm of the reproducer, harder and more durable substances may be used for the recording face of the record tablet.

While I have described the valves as covering a central opening 7 and one concentric opening outside of the same, which for some results is quite sufficient, or even the opening 7 alone might be used, still for other results a number of concentric openings 5 and 6 may be necessary for the best effect. Also, the air pressure may be varied and the results obtained be correspondingly changed. Again, I may use various other forms of valves and valve openings. For instance, in Figs. 9 and 10 is shown a valve opening 61 wherein there are a number of radial extensions of the central opening and the valve 62 is correspondingly shaped. In Fig. 11 a number of single elongated openings 63 are shown arranged parallel to each other in a continuous series, and in Fig. 12 there is shown a number of elongated valves 64 connected by a bar 65 so as to match the openings 63. In Fig. 13 there is a central opening 66 and a circular series of openings 67 surrounding the same and equi-distant from the central opening, while a number of disk valves 68 correspondingly mounted upon a spider 69 may be opposed to these valve openings. It will be understood, of course, that the valves 62, 64 and 68 are connected together in pairs by the rod 23 as in the other figures of the drawings. From this it will be seen that the invention is not limited to any special

type of valve, but the valve systems may assume a great variety of forms in addition to those shown in the drawings.

In order that the neck 12 may be adapted to all the several structures intended to be carried thereby, it may be formed as shown in Fig. 7 wherein the inner surface of the outer end of this neck is tapered, as shown at 70, and receives a correspondingly socketed bell 71 having a continuation 72 which may carry the microphonic element 54, or the horn 13, or any other structure adapted to this portion of the machine.

In Fig. 8 is shown a somewhat different construction from that shown in Fig. 7, wherein the neck 12 has an inner tapered wall 70 and an outer tapered wall 73. Engaging the tapered wall 70 is the beveled end of a tube 74 which may constitute a portion of the microphone 54 or horn 13 or other part, while a sleeve 75 surrounding the tube 74 and secured thereto in any suitable manner may have a tapered bell portion 76 receiving the tapered wall 73 of the end of the neck 12.

By means of the structures shown in Figs. 7 and 8, or some similar connection, the air valve structure may be adapted to receive interchangeably the microphonic element, or the horn, or a phonographic recorder, or, in fact, any acoustic element that may be adapted to the machine.

In the drawings there has been no attempt made to show the parts in accurate proportions, and it will be understood that the proportions may be varied from those shown in the drawings in accordance with the uses to which the instrument is to be put.

I claim:—

1. A sound-augmenting device comprising a conduit for fluid under pressure, two connected valves in said conduit for varying the flow of the fluid therethrough, one subjected to the fluid pressure on one side and the other subjected to an equal fluid pressure on the other side, and means for moving said valves to vary the flow of fluid through the conduit in accordance with sound-wave vibrations.

2. A sound-augmenting device comprising a suitable conduit for fluid under pressure, annular ports in said conduit, annular valve seats surrounding said ports, annular, balanced valves in operative relation to said valve seats, and means for moving said valves to and from the valve seats to vary the flow of fluid through the ports in accordance with sound-wave vibrations.

3. A sound-augmenting device comprising a two-part conduit for the passage of fluid under pressure, oppositely located ports constituting the means of communication from one part of the conduit to the other, two connected valves, one located in one part of the conduit and the other

in the other part of the conduit in operative relation to the valve seats, and means for moving said valves in accordance with sound-wave vibrations.

4. A sound-augmenting device comprising a conduit adapted to receive fluid under pressure, another conduit interior to the first-named conduit, annular ports between the two conduits, valve seats bordering said ports, one set of seats extending into one conduit and the other set of seats extending into the other conduit, annular valves in operative relation to the valve seats, and means for operating said valves in unison to vary the flow of fluid through the ports in accordance with sound-wave vibrations.

5. A sound-augmenting device comprising a conduit for fluid under pressure, two connected valves in said conduit for varying the flow of the fluid therethrough and having opposed faces subjected to equal fluid pressure, elastic supports for the valves, and means for actuating said valves in accordance with sound wave vibrations.

6. A sound-augmenting device comprising a conduit for fluid under pressure, two connected valves in said conduit for varying the flow of the fluid therethrough and having opposed faces subjected to equal fluid pressure, elastic supports for the valves, and adjusting means for regulating the position of the valves.

7. A sound-augmenting device comprising a conduit for fluid under pressure, balanced valve mechanism for controlling the flow of fluid through the conduit, elastic supports for the valve mechanism, adjusting means connected to the valve mechanism, said means being elastically supported at one end and having a screw adjustment at the other end, and means for actuating the valves in accordance with sound-wave vibrations.

8. In a sound-augmenting device, a two-part conduit for fluid under pressure, two connected valves having the same phase of movement and one located in one part of the conduit and the other in the other part of the conduit and subjected to the flow of the fluid under pressure on opposite sides, a deflector in the part of the conduit receiving the fluid from the other part of the conduit and located to divert the incoming fluid away from the adjacent valve, and means for actuating the valve mechanism in accordance with sound-wave vibrations.

9. A means for reproducing recorded sounds comprising a conduit for fluid under pressure, a balanced valve mechanism therein for controlling the flow of the fluid through said conduit, phonographic reproducer mechanism connected with the said valve mechanism and adapted to be actuated by a sound record, and means connected with said fluid conduit at the exit end thereof for still further augmenting the sound produced, by the variation of the flow of fluid by the valve mechanism.

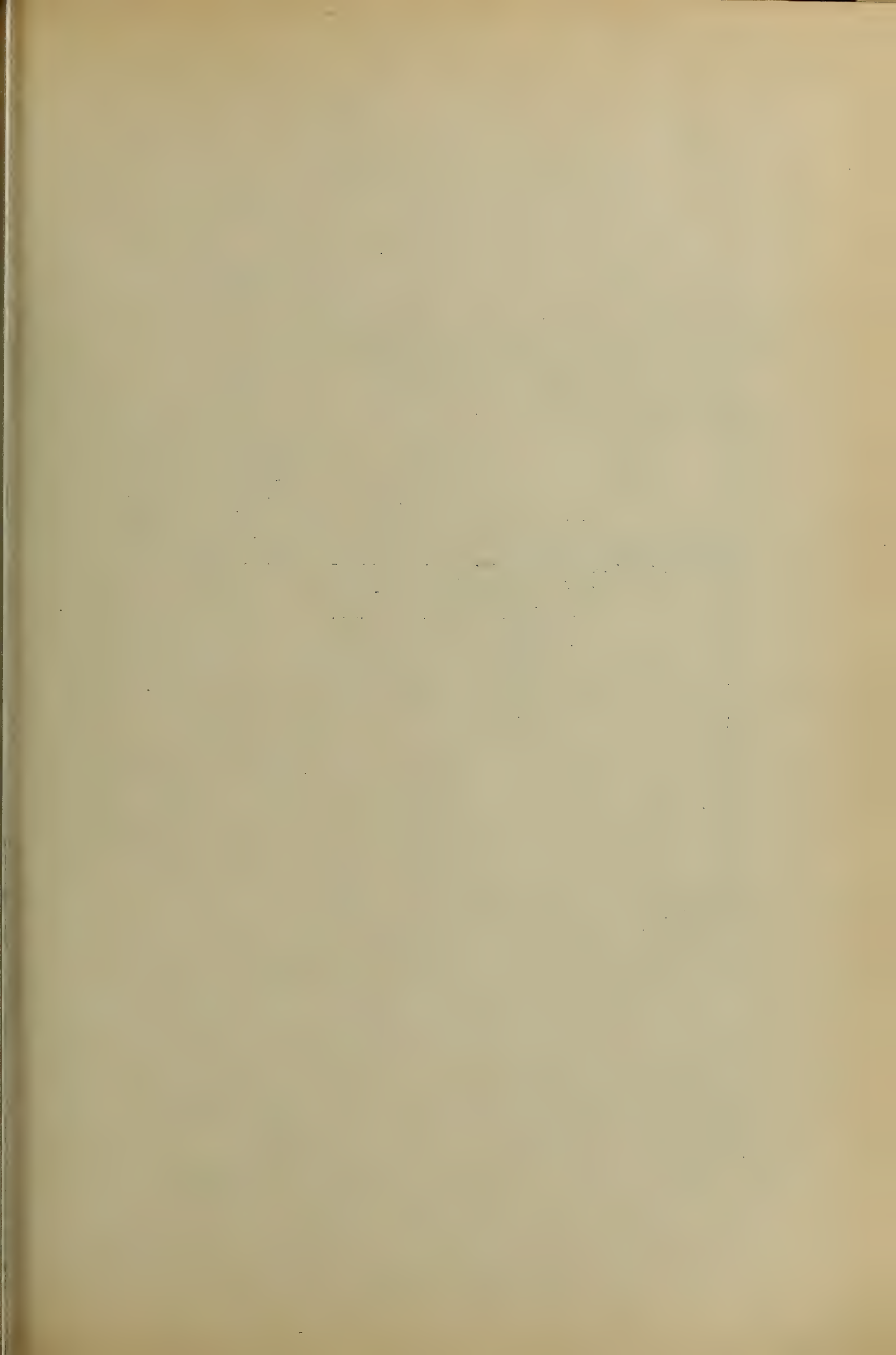
In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

NATHANIEL BALDWIN.

Witnesses:

WM. WITT,

JAMES WITT.



No. 869,749.

PATENTED OCT. 29, 1907.

J. C. STUCKEY.
STOP MECHANISM FOR TALKING MACHINES.

APPLICATION FILED APR. 24, 1907.

2 SHEETS—SHEET 1.

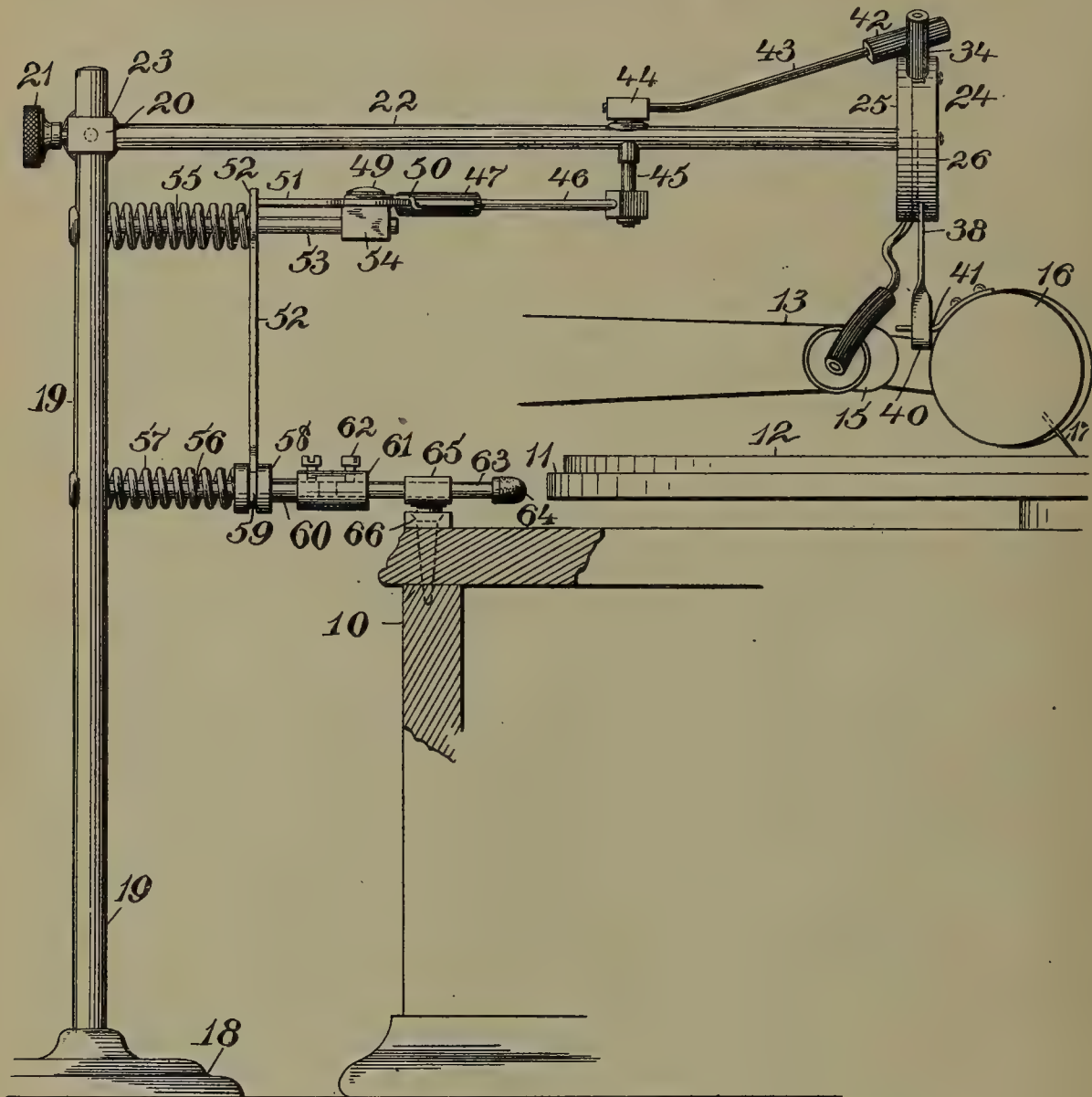


Fig. 1

WITNESSES:

E. A. Pell
S. A. Rogers.

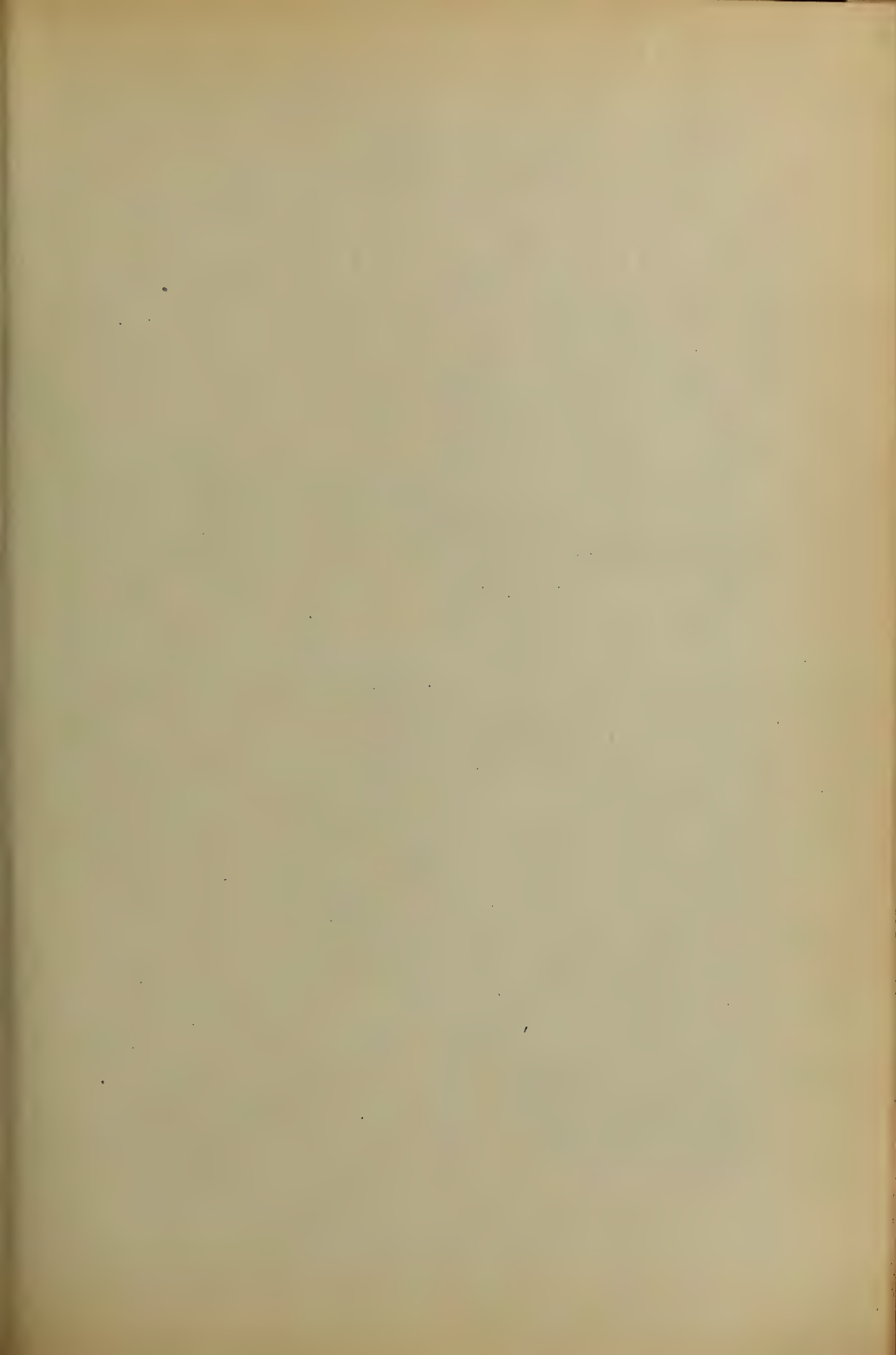
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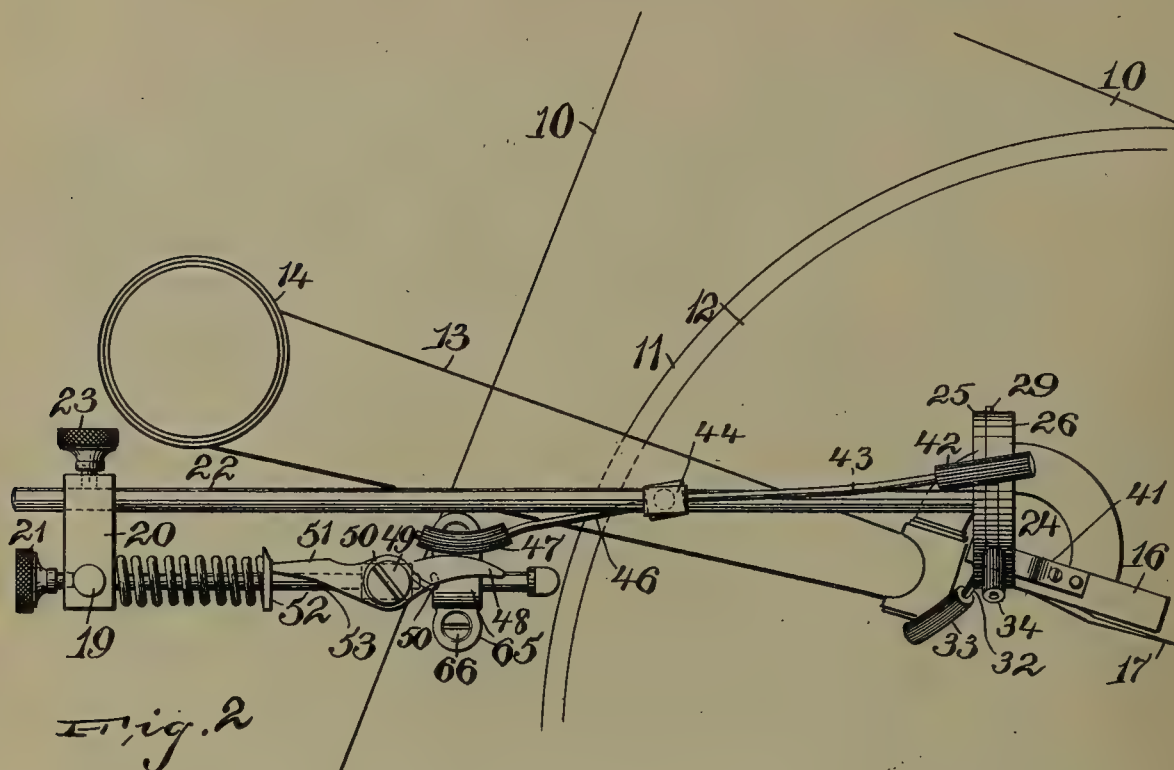


Fig. 2

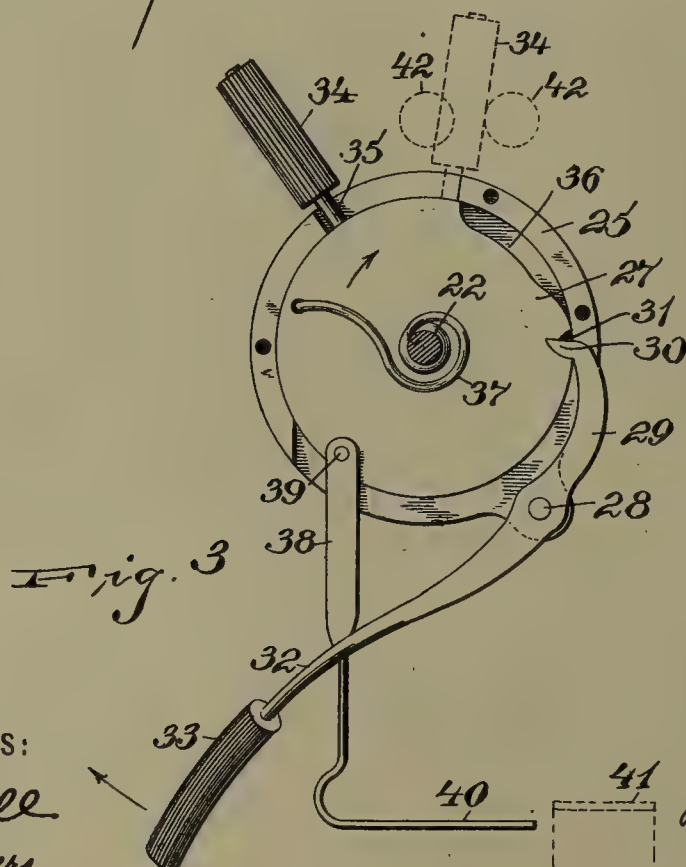


Fig. 3

WITNESSES:
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S. A. Rogers.

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UNITED STATES PATENT OFFICE.

JOHN C. STUCKEY, OF ELIZABETH, NEW JERSEY.

STOP MECHANISM FOR TALKING-MACHINES.

No. 869,749.

Specification of Letters Patent.

Patented Oct. 29, 1907.

Application filed April 24, 1907. Serial No. 369,898.

To all whom it may concern:

Be it known that I, JOHN C. STUCKEY, a citizen of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Stop Mechanism for Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

This invention relates to a device to be placed along side of a talking machine, and preferably along side of a disk machine, and is designed to provide a means for lifting the needle, with its sound box, from the record on the completion of the record, and is adapted to be adjusted before the record is started so that when the proper time arrives the device will be operated to lift the needle out of engagement with the disk.

Another object of this invention is to provide a device of this kind that operates a brake so that when the needle is lifted, the machine is automatically stopped so that if the operator is absent from the machine when it completes its record, the machine will stop and the needle is lifted away from the record and there is no further reproduction of any sounds. This device saves considerable winding, as the record will not rotate any more than is necessary to complete the reproduction. There is wear and tear saved on the works of the machine, and a better exhibition of the machine can be given with this automatic stoppage of sound on the mechanism.

The invention is illustrated in the accompanying drawings, in which

Figure 1 is a side view of my improved device showing its relation to a talking machine, and Fig. 2 is a top view showing a portion of the machine and its relation to the device. Fig. 3 is a face view of the tripping mechanism that releases the machine to stop the rotation of the disk, and also the means for lifting the sound box and the needle from the record.

I show, in the drawings, any usual form of talking machine 10 employing a rotating plate 11 that carries the record disk 12. In conjunction with this machine is employed a swinging arm 13 pivoted at 14, as is usual in this class of machines, and the usual sound box 15 is arranged on the end of the swinging arm or tube 13. As is usually mounted by means of a U-shaped tube, is arranged a reproducer 16 having a needle 17 projecting therefrom and adapted to rest on the record disk 12. In machines of this kind the needle is started on the groove of the record, near the periphery of the record disk, and it travels inward following the groove, and when it arrives near the center of the machine the record stops and the needle then runs on, and there is no

way of stopping the machine except through a manual manipulation.

In my device, however, when the sound box 15 has arrived at a point that brings the needle 17 to the end of the record groove, it is adapted to engage a mechanism to stop it. To support the mechanism for stopping the talking machine, I have devised a suitable base 18 with the vertical post 19, on which is arranged a block 20 that can be rotatably adjusted or adjusted vertically, and fastened by means of a set-screw 21. Projecting horizontally from the block 20 is a rod 22 adjustably secured by means of a set-screw 23, and on the outer edge of the rod 22 is mounted the tripping mechanism 24. This mechanism consists of two circular plates 25 and 26 which has mounted between them on the rod 22, a disk 27. Pivoted at 28, intermediate of its ends, is a lever, one end of which, 29, has a nose 30 that enters a detent 31 in the periphery of the disk, and the other end 32 of the lever projects downward therefrom and may be provided with a soft covering 33 which is preferably made of a ribbed elastic tubing.

The portion 33 of the lever 32 is the part that is engaged by the sound box 15 when it reaches its limit of movement, this being engaged at the proper time because before the record is started, the mechanism is shifted by means of the set-screws 21 and 23, so that by trial it is seen that the needle 17 is exactly at the end of the reproducing groove. Thus when the proper time arrives, and the record is in operation, when the needle arrives at the point where the record stops, the sound box presses over on the portion 33 of the lever 32, the tooth 30 is drawn out of the detent, and the disk 27 is snapped around by the spring 37 in the direction of the arrows shown on the disk in Fig. 3, and the strip 38, pivoted at 39, is at once drawn upward along with the hooked portion 40, which in the meantime has been placed under a strip 41 fastened to the reproducer by reason of the reproducer's side movement, and the reproducer is thus in a position to be lifted, and when the above described tripping takes place, the hook 40, cooperating with the plate 41, lifts the reproducer so that its needle is clear of the record.

A cut-away portion 36 is supplied on the disk so that when the disk is in its operated position, after lifting the reproducer, in other words before it is set, it allows the tooth 30 to occupy the position shown in Fig. 3, so that it does not bear on the outer periphery of the disk 27, and the portion 33 of the lever 32 is in the proper position for operation, when the apparatus is adjusted before it is started and the tripping will take place at the proper time. If this cut-away portion were not present, the nose would rest against the outer periphery of the disk 27, and when the apparatus was set the portion 33 would be enabled to drop, slightly, by reason of the nose entering the detent, and the record would be stopped before its completion. Projecting

from the disk 27 is a stud 35 carrying a soft covering 34, and when this stud is operated, by means of the disk being tripped, it hits a soft covering 42 on the end of a rod 43, mounted by means of a block 44 on a pivot 45. This rod 43 is thus violently thrown in one direction, and the corresponding movement of the rod 46 is caused, and its soft covering or end 47 engages the end 48 of a lever which is pivoted by means of the screw 49 and is normally held in position by a spring 50, which spring, however, is weak and only sufficient to prevent the lever from having an absolutely free movement. The other end of the lever has a nose 51 that is adapted to be thrown into and out of engagement with the bar 52. Thus when the mechanism is tripped, as before described, the end 47 of the rod 46 throws the lever by engaging its end 48, and the nose 51 is thrown out of engagement with the latch plate 52 which is mounted on a shaft 53, and a spring 55 throws the latch plate 52 over along the shaft 53, which shaft also supports the block 54 for holding the pivotal support 49. Below the shaft 53 and parallel thereto is a rod 56, and a spring 57, on the rod, bears against a slotted collar 58 in which the end 59, which is preferably forked, fits so as to move it in unison therewith, and by means of a coupling 61 and a screw 62, the shaft 63 is thrust forward, and the end 64 frictionally engages the periphery of the rotating plate 11 to stop the machine. The rod 63 is arranged in a bearing 65 that is secured by suitable screws 66 to the box of the machine 10.

This apparatus provides a quick and noiseless stopping of a talking machine, when the reproduction of a record is complete, and the reproducing needle is removed from the record at the same instant, not damaging the needle and providing for no unnecessary scratching on a record, the device being set before the record is started by moving the needle over to the point where the record stops, and adjusting the tripping lever against the sound box, and then when a record is started the above described operation causes a prompt cessation of all sound when the record is through.

Having thus described my invention, what I claim is:—

1. In combination with a disk talking machine having a swinging sound box and a pivoted reproducer, of a support having a brake thereon, a tripping mechanism on the support to be operated by the sound box, means operatively connected with the tripping mechanism for lifting the reproducer, the tripping mechanism being adjustable in its relation to a record on the machine, and an operative connection between the tripping mechanism and the brake to cause the brake to stop the machine when the reproducer is lifted.

2. In combination with a disk talking machine having a swinging arm with a sound box thereon, and a reproducer pivoted in the sound box, of a support, a tripping mechanism mounted on the support, a lever connected with the tripping mechanism and adapted to be engaged by the sound box, a hook operated by the tripping mechanism for lifting the reproducer, the tripping mechanism being adjustable in its relation to a record on the machine, a brake on the support adapted to stop the machine, and means for operating the brake when the reproducer is lifted.

3. In combination with a disk talking machine having a swinging arm with a sound box thereon, and having a pivoted reproducer, of a support, a tripping mechanism on the support, means for manually setting the tripping mechanism,

the tripping mechanism being adapted to be engaged by the sound box, a hook adapted to engage the reproducer to lift it when the tripping mechanism is tripped, a brake, a latch to lock the brake in an inoperative position, and a releasing means for the brake to cause it to operate, and means for operating the releasing means when the tripping mechanism is tripped.

4. In combination with a disk talking machine having a swinging sound box and a pivoted reproducer, of a support, a tripping mechanism on the support to be operated by the swinging mechanism, and means connected with the tripping mechanism for lifting the reproducer.

5. In combination with a disk talking machine having a swinging arm with a pivoted reproducer thereon, of a support, a tripping mechanism on the support, a lever projecting from the tripping mechanism and adapted to be engaged by the swinging arm, a stud for manually setting the tripping mechanism, a hook connected with the tripping mechanism and to be raised when the mechanism is tripped, a spring operated brake, a latch, means for locking the brake in its inoperative position, and an operative connection between the locking means of the brake and the stud of the tripping mechanism, whereby the brake is operated when the tripping mechanism is tripped.

6. A device of the kind described comprising a support, a horizontal rod projecting therefrom, a tripping mechanism on the end of the rod, a lever projecting therefrom, a lifting hook attached to the tripping mechanism, means for manually setting the tripping mechanism, a spring operated brake on the support, a latch on the brake, means for locking the latch in its inoperative position, a lever swinging to unlock the latch and being operated by the tripping mechanism when it is tripped, in combination with a plate on the reproducer of a talking machine adapted to be attached to the reproducer of the machine and to be lifted by the lifting hook, and a swinging arm to engage the tripping lever.

7. In a device of the kind described, a support having a rod projecting therefrom with a tripping mechanism on its end, a tripping lever projecting therefrom, parallel rods projecting from the support, a latch sliding on the rods, springs on the rods to actuate the latch in one direction, a reciprocating brake on the lower rod, a pivoted lever on the upper rod and arranged to engage the latch to lock it in its inoperative position, swinging arms pivoted on the upper rod of the machine and having one end adapted to engage the lever, the other pivoted arm being operated by the tripping mechanism.

8. In a device of the kind described, a tripping mechanism comprising a casing, a spring actuated disk therein, a tripping lever having a tooth to engage the disk, a detent in the disk to receive the tooth, a stud projecting from the disk for manually setting the tripping mechanism, and a hook suspended from the disk.

9. In a device of the kind described, a tripping mechanism comprising a casing, a spring actuated disk therein having a detent in its periphery, a tripping lever pivoted on the casing and having a tooth to enter the detent of the disk, and a hook suspended on the disk.

10. In a device of the kind described, a tripping mechanism comprising a casing, a rotatable disk arranged in the casing and having a detent in its periphery, a spring to automatically operate the disk, a tripping lever having a tooth thereon for entering the detent of the disk, a stud for manually manipulating the disk to set the tripping mechanism, and a hook suspended from the disk.

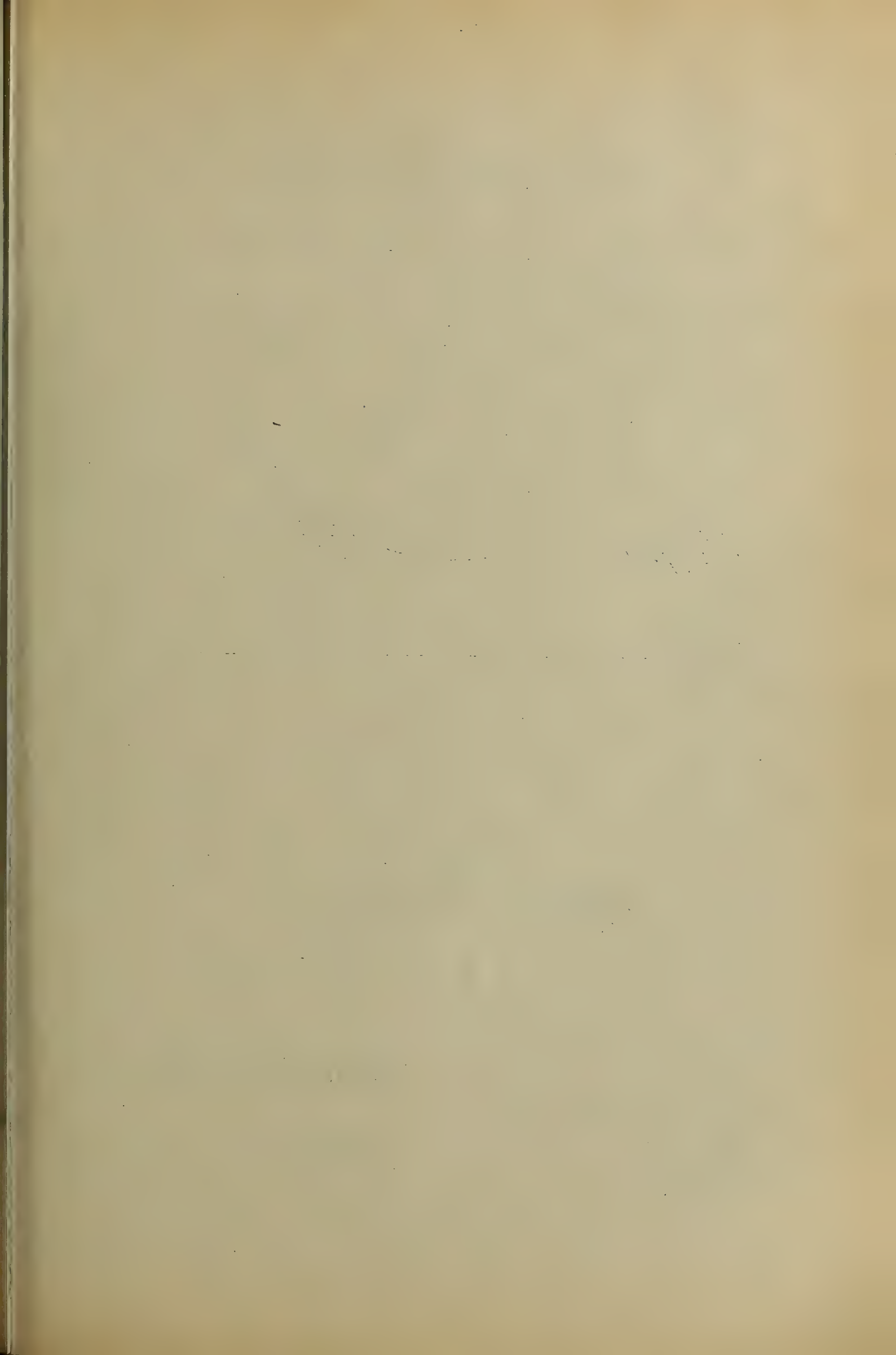
11. In a device of the kind described, a support, a horizontal rod projecting therefrom, means for rotatably, perpendicularly and horizontally adjusting the rod, and a tripping mechanism on the end of the rod to be tripped by and adapted to lift up the reproducer of a talking machine.

In testimony, that I claim the foregoing, I have hereunto set my hand this 23d day of April 1907.

JOHN C. STUCKEY.

Witnesses:

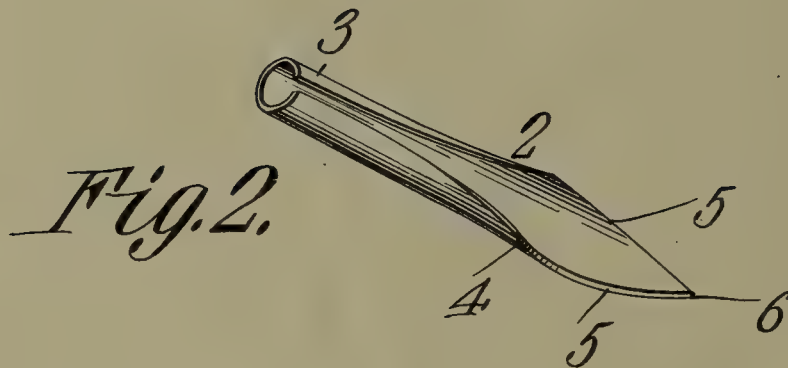
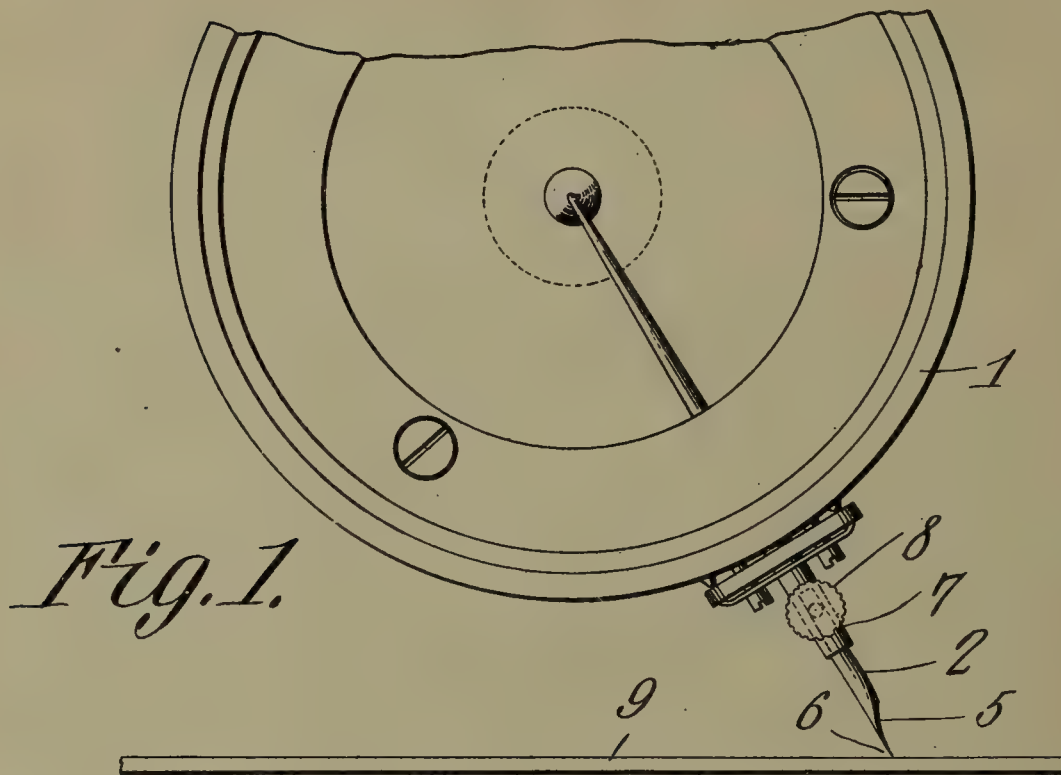
WM. H. CAMFIELD,
E. A. PELL.



No. 870,300.

PATENTED NOV. 5, 1907.

S. LEVIN.
STYLUS FOR SOUND REPRODUCING MACHINES.
APPLICATION FILED MAR. 7, 1907.



WITNESSES:
E. J. Stewart
F. J. Chapman

Samuel Levin,
INVENTOR.
By *CA Snow & Co.*
ATTORNEYS

UNITED STATES PATENT OFFICE.

SAMUEL LEVIN, OF HIGHLAND PARK, ILLINOIS.

STYLUS FOR SOUND-REPRODUCING MACHINES.

No. 870,300.

Specification of Letters Patent.

Patented Nov. 5, 1907.

Application filed March 7, 1907. Serial No. 361,122.

To all whom it may concern:

Be it known that I, SAMUEL LEVIN, a citizen of the United States, residing at Highland Park, in the county of Lake and State of Illinois, have invented a new and useful Stylus for Sound-Reproducing Machines, of which the following is a specification.

This invention has reference to improvements in the reproducing point or stylus for sound-reproducing machines, and its object is to provide a stylus which will give a mellow and soft-toned reproduction, more particularly from flat or disk-shaped records wherein the sound record is represented by a sinuous groove of even depth. The usual form of stylus used with sound-reproducing machines of the type wherein flat record tablets of hard, resistant composition are employed, is that of a steel needle having the point sufficiently sharp to follow the groove. Such needles not only wear away themselves but also wear away the walls of the sound-groove and in a comparatively short time the finer sound waves, representing the over-tones, are either destroyed or distorted; and these delicate tones, which impart to the reproduced sound that characteristic known as "quality", having been destroyed, the reproduced tones become harsh and unnatural and disagreeable to the ear. Also, the improved stylus obliterates the harsh, disagreeable scratching or scraping noises which are found so obtrusive when the hard steel needles are employed for the reproduction of sound from the resisting tablets of hard material.

The invention consists essentially in making a stylus of semi-elastic, non-resonant, homogeneous material with a cylindrical or nearly cylindrical portion adapted to fit into the stylus socket provided at the end of the stylus lever actuated by the diaphragm of the sound-reproducing sound box, and the other or free end of this stylus is preferably widened and then narrowed to a point and suitably curved or bent to make this part of the stylus elastic yet strong and resisting, and more particularly resisting in the plane of travel of the stylus when under the impelling action of the sound waves.

The invention will be fully understood from the following detailed description taken in connection with the accompanying drawings forming part of this specification, in which,—

Figure 1 is a side elevation, upon an enlarged scale, of a portion of a sound-reproducing sound box with the improved stylus in place therein; and Fig. 2 is a perspective view of the stylus upon a larger scale than is shown in Fig. 1.

Referring to the drawings, there is shown a sound box 1 which may be of any desirable construction such as is used in connection with sound-reproducing machines wherein the flat disk records are employed, and no special description of such sound box is necessary

since in itself it forms no part of the present invention. The stylus 2 is composed of a piece of horny, homogeneous, hard material such as a thin piece of horn or goose quill or celluloid or some such substance having one end bent or curled up into a cylinder or into approximately cylindrical shape, as indicated at 3, and the other end spread out into a nearly flat shape, as indicated at 4, and then with the sides 5 approaching each other until they finally merge into a point 6, the whole structure being similar in appearance to that of the well-known quill pen. The cylindrical portion 3 is of such size as to fit snugly into the stylus-holding socket of the sound box and be there retained by the ordinary clamp screw 8, which latter, engaging the cylindrical portion 3, will serve to hold the improved stylus firmly in place in the socket 7.

When the parts are in proper position the point 6 will rest in a sound groove upon the record tablet, which latter is indicated at 9 in Fig. 1, and the sound waves will impart motion to the stylus 2 and from thence to the sound box diaphragm in the usual manner. But because of the peculiar nature of the material used, the impulses transmitted to the diaphragm are modified in such manner that the reproduced sound is very mellow, soft, distinct and natural, and the tones are very pleasing to the ear and especially adapted for small rooms, although the reproduction is sufficiently penetrating to be heard in the largest auditorium.

The peculiar shape of the stylus makes it sufficiently stiff to bear the weight of the sound box and the parts carried thereby and it is particularly resistant to changes in shape in the plane of the vibrations imparted to it by the sound record groove.

The peculiar nature of the material from which the stylus is made, more particularly when it is made of quill, is such that the record groove is not worn perceptibly by the action of the stylus thereon, and, consequently, records reproduced with the improved stylus are practically unaffected by the reproduction and will never become worn or defective from such reproduction.

It is also found that with a stylus constructed in accordance with my invention the harsh, grating, scratching noises so often heard in reproductions from record tablets where the steel stylus is used, are not heard at all, and this may be due to the absorption of the sudden, short, violent impulses, which give rise to these harsh and grating sounds, by the stylus, and the reproducing diaphragm is therefore not affected by them.

Whatever be the reason, the practical operation of the stylus has demonstrated that the reproduced sounds are mellow and sweet and of extreme purity and are also free from all extraneous sounds which tend to mar, and, under some circumstances, to even obliterate

ate portions of the reproduced sounds from the flat sound records made of hard, resisting material.

I claim:—

- 5 1. A stylus for sound-reproducing machines composed of a thin piece of horny, homogeneous material having one end bent into a cylinder of a size to fit the stylus-holding socket of a sound-box and the other end bent out into an approximately flat shape with the sides approaching and merging into a point adapted to the sound groove of a
10 sound record tablet.

2. A stylus for sound-reproducing machines composed of a thin piece of quill bent at one end into a cylinder of a size adapted to fit the stylus socket of a sound-box and the

other end formed approximately flat with side walls tapering to a point adapted to engage a sound record groove. 15

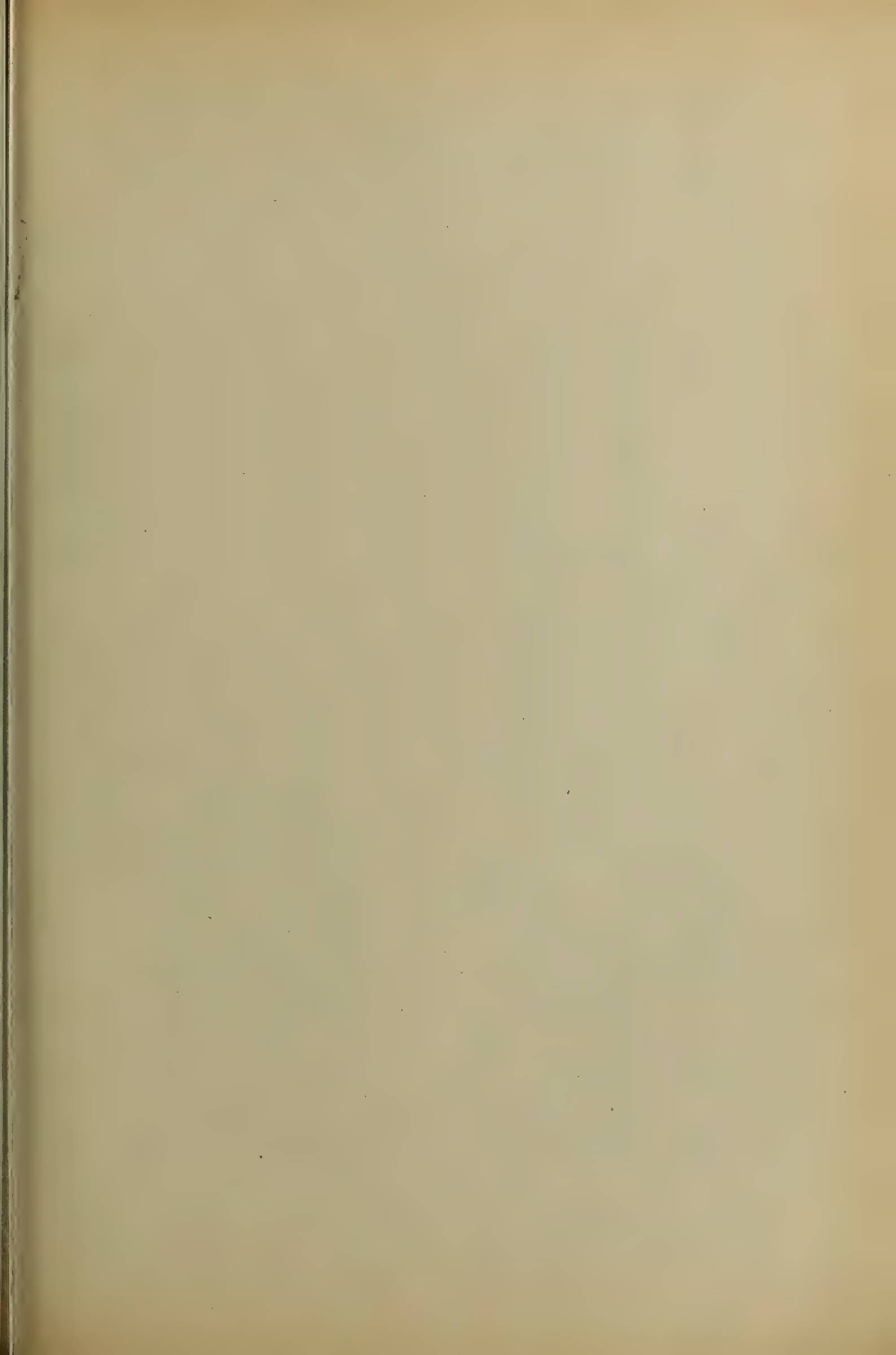
3. A stylus for sound-reproducing machines having a rounded or cylindrical shank and a flat, thin, tapering, pointed end of substantially equal thickness throughout and wide in the direction of vibration.

In testimony that I claim the foregoing as my own, I 20 have hereto affixed my signature in the presence of two witnesses.

SAMUEL LEVIN.

Witnesses:

W. N. GOODRIDGE,
GEORGE HESLER.

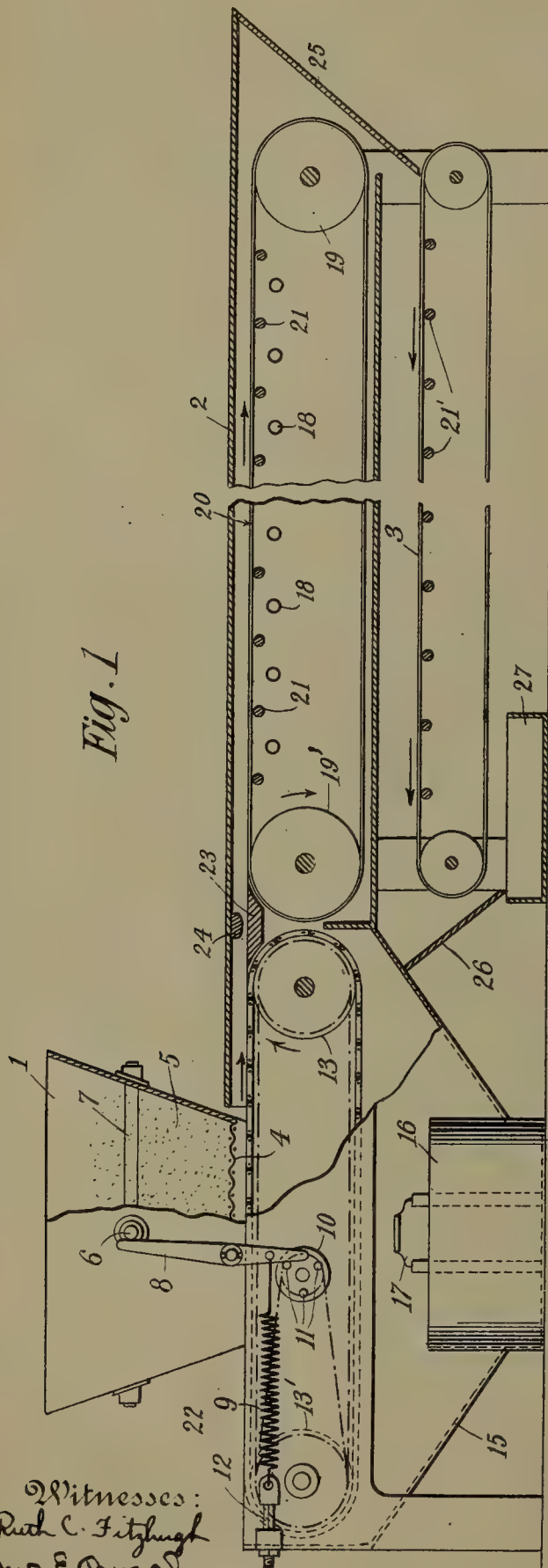


T. H. MACDONALD & F. L. CAPPS.

APPARATUS FOR COATING DISKS AND SIMILAR ARTICLES.

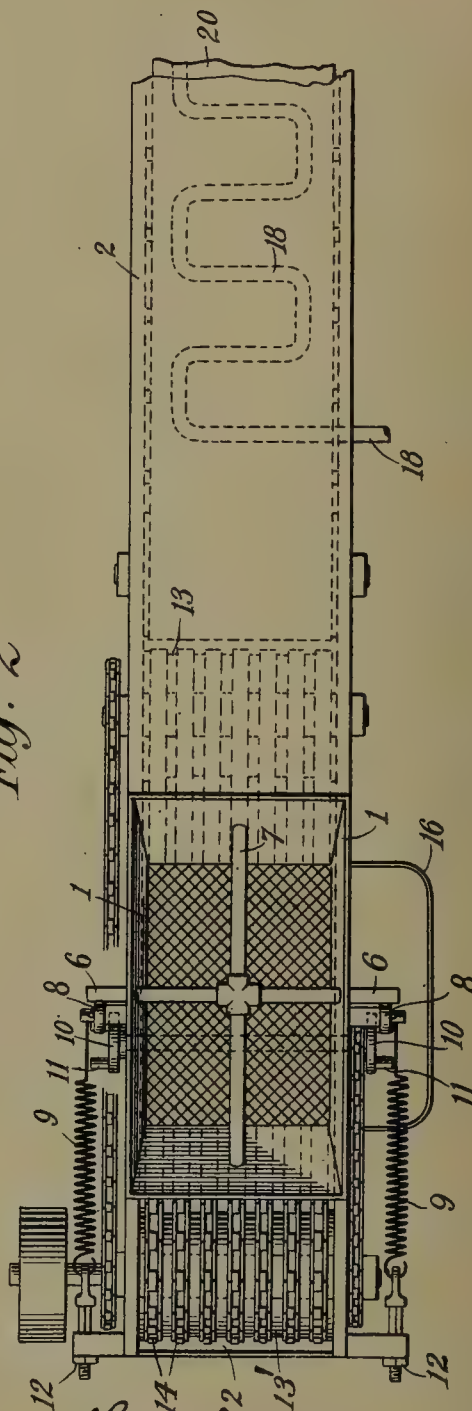
APPLICATION FILED FEB. 14, 1907.

Fig. 1



Witnesses:
Ruth C. Fitzhugh
Geo. E. Burch.

Fig. 2



Thomas H. Macdonald,
By Frank L. Capps,
Inventors.
Mauve Cameron Lewis & Masie,
Attorneys.

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD AND FRANK L. CAPPS, OF BRIDGEPORT, CONNECTICUT, ASSIGNORS
TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

APPARATUS FOR COATING DISKS AND SIMILAR ARTICLES.

No. 870,569.

Specification of Letters Patent.

Patented Nov. 12, 1907.

Application filed February 14, 1907. Serial No. 357,397.

To all whom it may concern:

Be it known that we, THOMAS H. MACDONALD and FRANK L. CAPPS, both residents of the city of Bridgeport, Connecticut, have invented a new and useful
5 Improvement in Apparatus for Coating Disks and Similar Articles, which improvement is fully set forth in the following specification.

This apparatus is for use in the preparation of disk sound-records, and comprises a hopper or sieve, a com-
10 pound conveyer, a heating-box, a return conveyer, and suitable actuating mechanism.

The object of the invention is to carry forward the ideas suggested in the Hoyt & Gaven patents of January 2, 1906, (Nos. 808,842, 808,843, and 809,263), and
15 as more particularly set forth in certain other pending applications.

The particular purpose of this apparatus is to place upon suitable disks of paper or the like the proper quantity of "glaze" which is to constitute the surface
20 of the disk sound-records.

The invention will be best understood by reference to the accompanying drawings that represent one embodiment thereof.

In these drawings Figure 1 is a side view partly
25 broken away; and Fig. 2 a plan of a portion of the apparatus.

1 represents the hopper, 2 the heating-box, and 3 the return conveyer. At the bottom of the hopper 1 is a grating 4, having a mesh somewhat larger than is necessary to permit the passage of the powdered material.
30 The latter, indicated at 5, will not flow freely through the grating, because of its tendency to pack.

6 and 7 represent two metal rods or bars mounted in the hopper as indicated, the ends of one of them, as 6,
35 extending on each side beyond the walls of the hopper, so as to be acted upon by the striker 8. There is one of these strikers 8 on each side of the apparatus. It is shown as pivoted to the hopper and connected near one end to a strong spring 9 which tends to hold its other
40 end against the protruding end of the bar 6; while the revolutions of disk 10, carrying one or more (three) pins 11, raise this striker from the bar 6, against the action of its spring 9; and as soon as each pin releases the striker, its spring causes the latter to strike a sharp
45 blow upon the end of the rod 6.

At 12 is shown an adjusting-nut for regulating the tension of the spring 9 so as to regulate the force of the blow.

13—13' represent drums or the like carrying a plurality of endless chains 14, which latter operate not only as a conveyer, but also as a sieve as will be explained. The drum 13 is driven by power in any suitable manner, which will likewise revolve the disks 10,
50 as by a sprocket-chain or belt.

15 is a pit located beneath the chains 14, so that all of
55 the powdered material 5 that does not fall upon a paper disk, will fall through into this pit 15. By arranging a trough 16 in front of the pit, from which it may be separated by a vertically-sliding door 17, the material that falls through may be scooped up and replaced in
60 the upper hopper 1. A casing incloses conveyer 14 and pit 15, to prevent the escape of material in the form of dust etc.

The heating-box 2 consists of a long tunnel or casing through which extends a number of steam-coils 18. 65

19—19' represent drums carrying the endless belt or conveyer 20, drum 19 being driven in any convenient manner, but preferably independent of drum 13. A number of rollers (one of which is shown at 21) may be employed to support the upper surface of the conveyer,
70 or the conveyer may run upon the steam-pipes 18.

The drum 13' is placed below and in front of the hopper 1, so that an attendant may feed the paper tablets (preferably coated with resin) upon the portion of conveyer 14 which is there exposed by the omission of the casing at 22. The drum 19' of the conveyer in the heat-box is mounted as close as may be to the drum 13 of the chain-conveyer; and a bridge 23, whose edges are concave to correspond to the two adjacent drums, is mounted between the two and as close to them as convenient. A depending partition 24 may be arranged above bridge 23, leaving between the two only sufficient space for the passage of the successive coated disks. 80

At the extreme end of the heat-box, and beyond its
85 conveyer, is the reversing-plate 25, diagonal as shown, so as to deliver the heated disks, face downward, to the return-conveyer 3, which needs no further description (except to say that its upper portion may be supported by a number of rollers as 21'). In front of the return
90 conveyer, which is open to the air, and upon which a cooling breeze may be caused to play (or it may be otherwise cooled), may be another diagonal reversing-plate 26, to deposit the successive disks, right side up, into a basket or tray 27. The plate 25 is arranged
95 diagonally as shown merely because the return-conveyer lies underneath the heat-box; if it were desired to have the return-conveyer to extend in the same direction beyond the heat-box, of course there would be no need for arranging this plate 25 diagonally. But
100 if the plate 25 is arranged to reverse the disks, then it is desirable to have the plate 26 diagonal so as to turn the disks right side up, though this latter may be dispensed with.

The operation of our apparatus is as follows: The
105 hopper having been more or less filled with the powdered "glaze", and the proper tension having been imparted to the spring 9 (by the nut 12), the attendant

proceeds to place, one after the other, the (resined) disks upon the conveyer 14, at the open space 22 in front of the hopper. As each disk is being carried beneath the sieve 4, the striker 8 is striking smartly upon the framework 6—7, and causes a shower of the powdered material to descend. A sufficient amount is deposited upon the disks in the course of the travel beneath the sieve 4, while the balance of the shower falls into the pit 15 from which it may be used again to replenish the hopper. Meantime, the powdered disks are being carried over the bridge-piece 23 and deposited upon the conveyer in the heat-chamber 2. This chamber should be of considerable length, that the powdered material may be subjected to the heat a sufficient length of time, in order that it may become soft enough to cohere and to adhere to the paper disk. When the disk reaches the end of this chamber, it falls upon the inclined plate 25, and is thereby inverted and delivered face downward upon the cooling conveyer 3; so that, by the time it is delivered into the tray 27, it may be of about normal temperature. If the powder falls too freely, the tension of spring 9 is lessened, so that the blow struck shall not be so heavy, and less powder will fall; and vice versa. The length of the heating-box depends somewhat upon the speed of travel of the conveyers. If they travel very slowly the heat-box may be comparatively short, since the powder will be subjected to the heat during a comparatively long period of time; but if the apparatus be made to run faster, so as to turn out more work in a given time, the heat box should be lengthened accordingly.

The tablets or disks referred to may be of paper or thin cardboard or other suitable material, and they will preferably be coated with resin; and the powdered material referred to may consist wholly or in more or less large proportions of shellac. But the nature of the disks and of the powdered material form no part of the present invention, since our apparatus may be employed for coating any body with any powdered or granular material.

Changes may be made in the construction and arrangement of the parts, and some of the parts of our in-

vention may be used to the exclusion of others, without departing from the spirit of the invention, since we do not limit ourselves to the precise details set forth, having described them with some particularity solely for the sake of clearness.

Having thus described our invention, we claim:

1. The combination of a hopper containing a sieve, a perforated conveyer beneath the same, a striker acting upon said hopper, means for regulating the force of said striker, and means for actuating said conveyer and said striker.

2. The combination with a hopper having a sieve, and a perforated conveyer beneath the same, of a heat-box containing a second conveyer in juxtaposition to the first conveyer.

3. The combination with a hopper having a sieve, and a perforated conveyer beneath the same, of a heat-box containing a second conveyer in juxtaposition to the first conveyer, and a bridge spanning the space between the two conveyers.

4. The combination of a hopper and a conveyer beneath the same, a heat-box having a second conveyer in juxtaposition to the first conveyer, and a cooling conveyer adjacent to said heat-box.

5. The combination of a hopper and a conveyer beneath the same, a heat-box having a second conveyer in juxtaposition to the first conveyer, a cooling conveyer adjacent thereto, and means for inverting articles carried by said heating conveyer to deliver them upside down on the cooling conveyer.

6. The combination with a hopper having one or more transverse bars, a revoluble disk having pins, a lever having adjustable spring control and mounted to be actuated by said pins and to strike upon said bar.

7. A hopper having a sieve, a perforated conveyer beneath the same, common means for imparting a blow to said hopper and for driving said conveyer and means for adjusting the force of the blow.

8. In a disk-coating apparatus, a hopper having a sieve, a plurality of endless chains beneath the same and constituting a perforated conveyer, a casing inclosing said chains and a pit beneath the same, and a trough adjacent to said pit.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.
FRANK L. CAPPS.

Witnesses:

A. B. KEOUGH,
C. A. GIBNER.

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7-45
4

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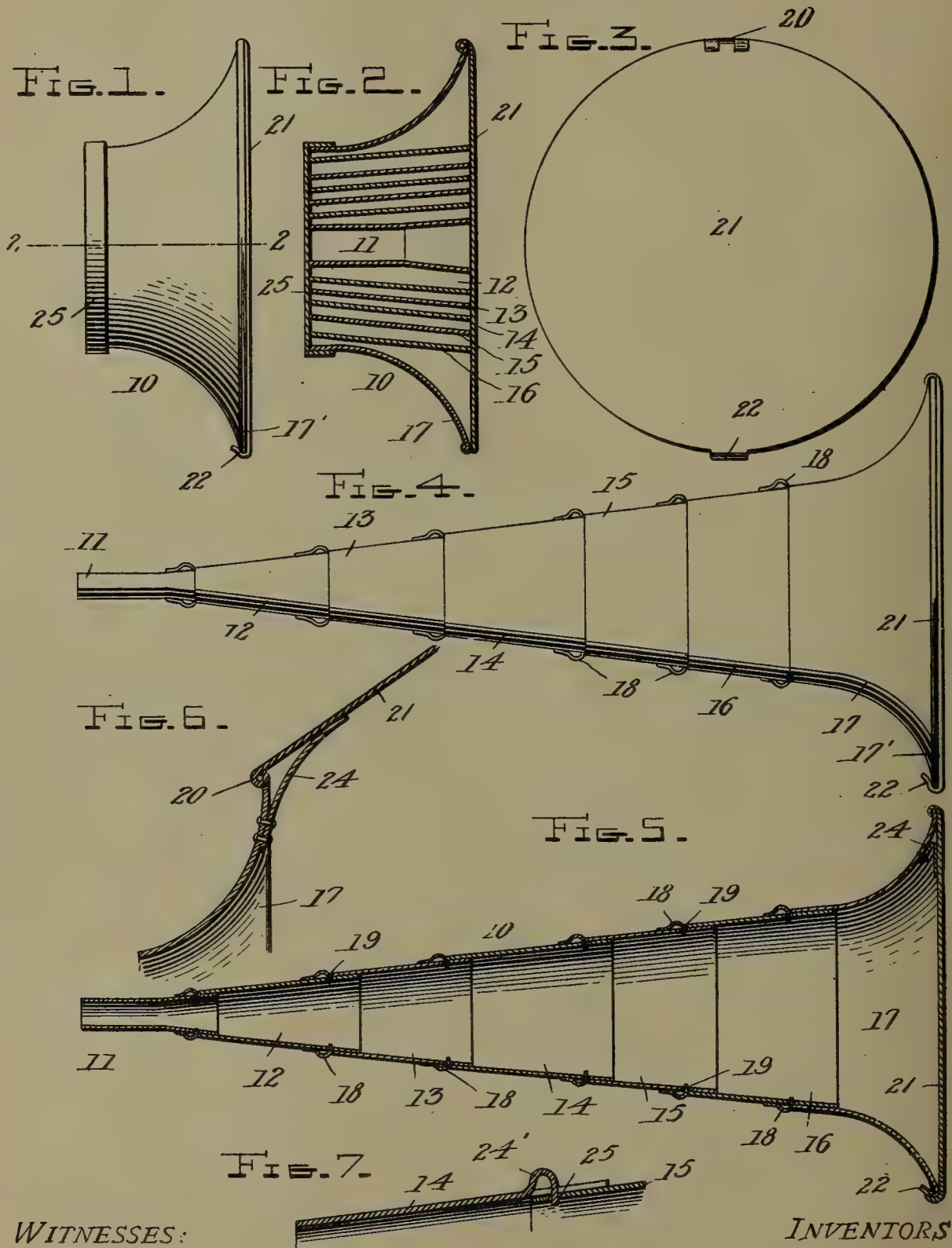
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No. 870,698

PATENTED NOV. 12, 1907.

J. C. STOCKER & D. A. WELSH.
FOLDABLE PHONOGRAPH HORN.

APPLICATION FILED APR. 22, 1907.



WITNESSES:

James A. Stocker
Bill V. Cooney

INVENTORS

Julius C. Stocker,
D. A. Welsh.
BY *Woodward & Chandler*

Attorneys

UNITED STATES PATENT OFFICE.

JULIUS C. STOCKER, OF PITTSBURG, AND DARRELL A. WELSH, OF MOUNT OLIVER,
PENNSYLVANIA.

FOLDABLE PHONOGRAPH-HORN.

No. 870,698.

Specification of Letters Patent.

Patented Nov. 12, 1907.

Application filed April 22, 1907. Serial No. 369,497.

To all whom it may concern:

Be it known that JULIUS C. STOCKER and DARRELL A. WELSH, citizens of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, and Mount Oliver, in the county of Allegheny and State of Pennsylvania, respectively, have invented certain new and useful Improvements in Foldable Phonograph-Horns, of which the following is a specification.

10 This invention relates to horns and is particularly adaptable for graphophones, phonographs and other musical instruments.

15 An object of the invention, is to provide a horn, capable of being collapsed, whereby the same may be carried in the pocket at the time of transporting the machine to which the horn is to be attached, or upon shipment or storage of such horn, where it will be seen that a large number may occupy a small floor space.

20 A further object of the invention is to provide a collapsible horn, made up of telescopic sections, said sections having means whereby they may be securely locked to each other when in use, and to provide means for holding said parts from displacement when the horn is not in use.

25 Another object is to provide a horn extremely simple in construction, strong, durable and therefore inexpensive to manufacture.

30 In the drawings: Figure 1 is a side elevation of my horn collapsed. Fig. 2 is a section therethrough on the line 2—2 in Fig. 1. Fig. 3 is an end view. Fig. 4 is a side elevation of the horn extended. Fig. 5 is a vertical longitudinal section therethrough. Fig. 6 is a detail section. Fig. 7 is a modified form.

35 Referring specifically to the drawings, 10 denotes the horn, which comprises the mouthpiece 11, the sections 12, 13, 14, 15, 16 and the bell 17, all being constructed to slide one within the other.

40 To securely lock the sections together after being extended ready for use, we provide on each section oppositely disposed, leaf springs 18, which work through slots 19, formed in their respective sections, and are adapted to spring behind the ends of said sections.

45 When it is desired to collapse the horn, the springs 18 on the mouthpiece 11 are first depressed and pushed within the section 12, the springs 18 on the sections 12 are then depressed and the section 12 held within the

section 13; this operation is continued throughout the remaining sections of the horn.

Hinged to the bell 17, as at 20, is a closure 21 which is provided opposite the hinge 20 with a clasp 22 adapted to engage the bead 17' of the bell 17, when the horn is collapsed. At 23 on the inside of the bell 17, and adjacent the hinge 20 is a spring 24 which serves to hold the closure 21 in an open position after the clasp 22 has been disengaged from the bead 17'. 50 55

At 25 is shown a cap which I place on the other end of the section 17, when the horn is collapsed, thus it will be seen that when the sections of the horn are collapsed they are held within the bell 17 by the hinged closure 21 at one end, and the cap 25 at the other. 60

In the modified form of my invention shown in Fig. 7 springs 24, are stamped out of the sections 11, 12, 13, 14, 15 and 16, and work through a slot 25 therein.

What is claimed is:

1. A collapsible horn comprising telescopic sections, the sections having slots formed therein and located to lie outwardly of the adjacent sections when the horn is extended, springs connected with said sections and engaged in the slots, said springs lying normally in position to engage the adjacent sections to hold the horn in extended position, and being movable through the slots out of said position, a hinged closure for the outer of said sections a spring carried by the outer section and arranged to hold the closure in an elevated position when the sections are extended, and a removable closure for the opposite end of the outer section. 65 70 75

2. A horn comprising a plurality of telescopic sections, including a bell section, a removable closure on one end of bell section, a hinged closure on the other end of said bell section, a spring carried by said section and bearing against said closure to hold the closure in an elevated position, and means for holding the closure in operative position. 80

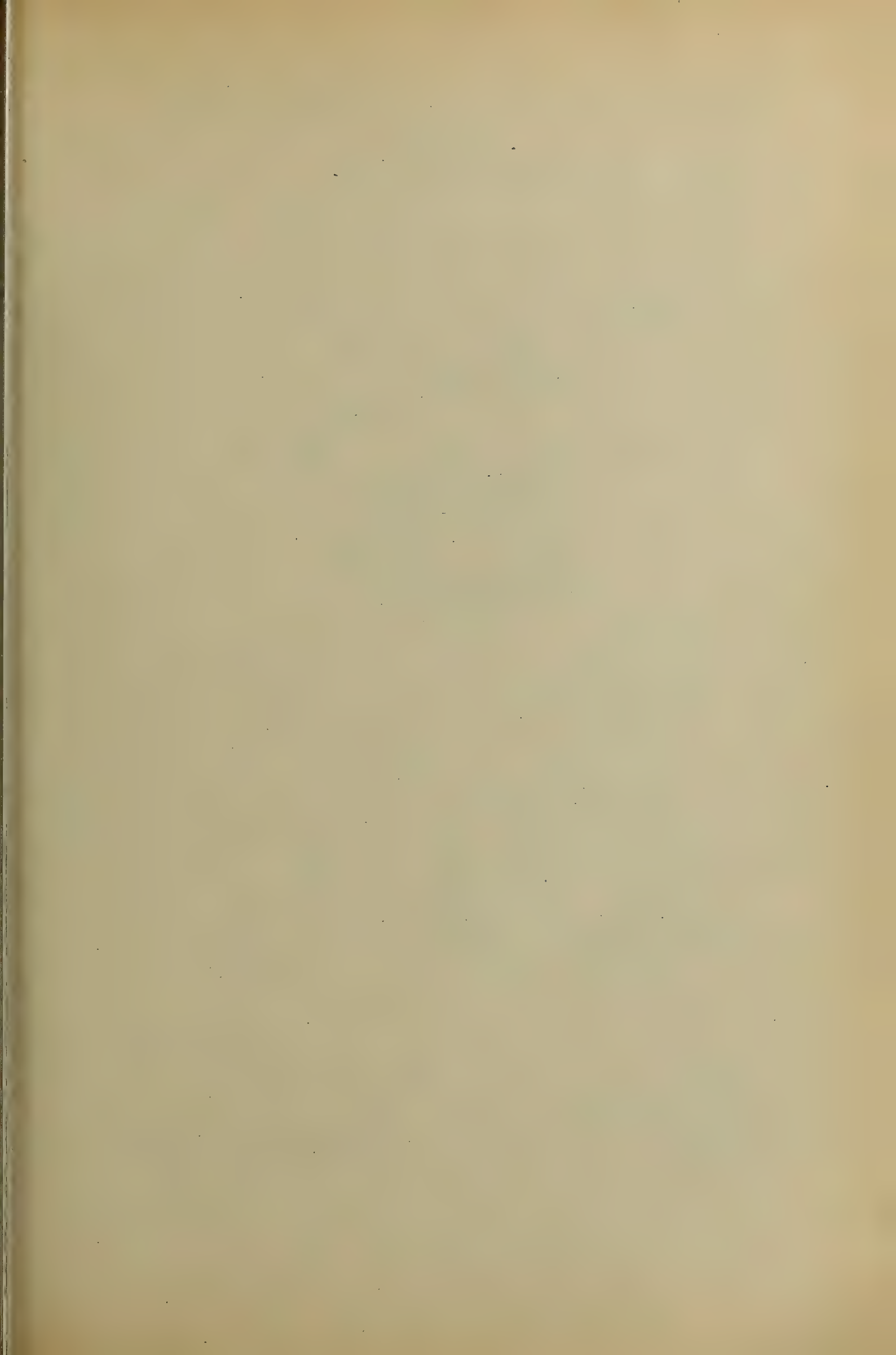
3. In a collapsible horn, the combination with telescopic sections having slots formed therein and located to lie outwardly of the adjacent sections when the horn is extended, of springs connected with said sections and engaged in the slots, said springs lying normally in position to engage the adjacent sections to hold the horn in extended position, and being movable through the slots out of such position. 85 90

In testimony whereof we affix our signatures, in presence of two witnesses.

JULIUS C. STOCKER.
DARRELL A. WELSH.

Witnesses:

WILLIAM ESPY,
LUDWIG MAYER.



F. D. HALL.
TALKING MACHINE NEEDLE.
APPLICATION FILED JULY 9, 1906.

Fig. 1.

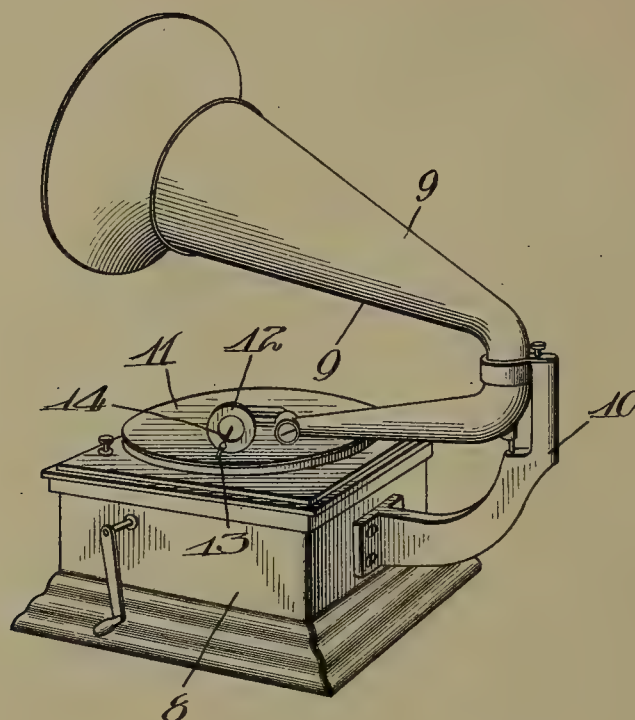


Fig. 2.

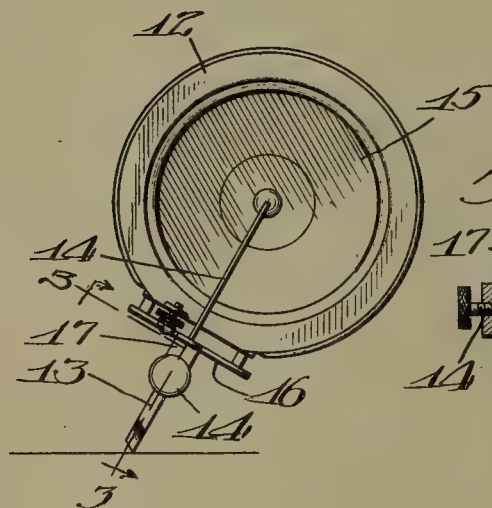


Fig. 4.

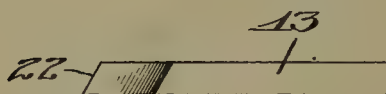


Fig. 5.

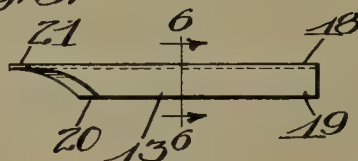


Fig. 3.

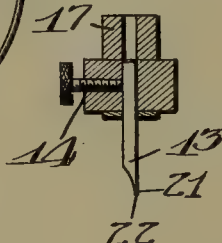
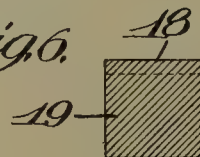


Fig. 6.



Witnesses:

Robert H. Weir.
G. V. Donarum.

Inventor:
Frederick D. Hall.
By Buckley & Durand
Attys.

UNITED STATES PATENT OFFICE.

FREDERICK D. HALL, OF CHICAGO, ILLINOIS.

TALKING-MACHINE NEEDLE.

No. 870,723.

Specification of Letters Patent.

Patented Nov. 12, 1907.

Application filed July 9, 1906. Serial No. 325,211.

To all whom it may concern:

Be it known that I, FREDERICK D. HALL, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Talking-Machine Needles, of which the following is a specification.

My invention relates to improvements in talking machines, and has for its object the production of a device by means of which the quality of the tone produced is greatly improved.

A further object is the production of a device for reproducing the sound from the record disk without materially injuring the disk itself.

A further object is the production of a practical and inexpensive device for reproducing the sound from the record disk.

These and such other objects as may hereinafter more fully appear are attained by my device, embodiments of which are illustrated in the accompanying drawings, in which,

Figure 1 represents a perspective view of a talking machine showing my device in position. Fig. 2 represents an enlarged view of the reproducer showing my reproducing needle in place. Fig. 3 is a cross-section on line 3—3 of Fig. 2, looking in the direction indicated by the arrows. Fig. 4 is a bottom view of my improved needle. Fig. 5 is a side elevation of my improved needle. Fig. 6 is a cross-section on line 6—6 of Fig. 5, looking in the direction indicated by the arrows.

Like numerals of reference indicate like parts in the various figures of the drawings.

Referring now to the figures, 8 represents the talking machine case, 9 the horn, 10 the horn support, 11 the record disk, 12 the reproducer, and 13 the reproducer needle. A metallic arm 14 is secured to the center of the diaphragm 15, and the other end secured to the frame 16, which frame is secured to the shell of the reproducer. A block 17 is secured to this frame, in an opening of which is secured the reproducing needle 13. A set-screw 14 passes through the block and into the opening, engaging the side of the reproducing needle, clamping it securely in place. This needle is composed of vegetable fiber. I have found that a fiber comprising an inner comparatively soft portion and a hard outer shell or crust is especially adapted to my purposes. The material by the use of which I have so far been able to derive the most satisfactory results is a portion of bamboo forming the needle in such a manner that the outer casing of the bamboo shall form one of the outer sides of the needle.

The needle is constructed in any form desired, such, for instance, as having a square cross-section as shown in Fig. 6. The outer hard fiber is shown in this figure as 18, and the inner softer fiber, as 19. In preparing

the needle for use, a portion of the inner fiber is cut away toward one end, at 20, the needle terminating in a thin portion 21. This makes an angular chisel-shaped end consisting entirely of the hard outer shell of the fiber. This end may be left at right angles to the needle itself, or may be cut to an acute angle, as shown at 22. I find in practice that such an angle is well adapted for the purpose of allowing the reproducer to follow the sound undulations as recorded in the record disk and thus to faithfully reproduce the sound to the horn. It is obvious that the same result might be obtained by securely fastening together layers of vegetable fiber of different density and degrees of hardness, or by using a fiber or wood in which the harder portions might be on the inside of the piece, in which case cuts would be made on the two opposite sides tapering toward the middle at the end. So, also, I have shown the cut between 20 and 21 as curved. Of course, this cut could be straight, but in practice I find that a greater resiliency is given the needle and a corresponding clearness to the tone reproduced by the curved cut shown. So, also, the cross-section of the fiber, while it is shown as square, it is evident that it might be round, in which case, if desired, a portion of the outside could be cut off toward the end, leaving a point in the center, the same, for instance, as shown in a sharpened lead pencil.

While I have shown in the drawing and in the explanation above that the harder portion or shell of the fiber is used as the point of the reproducing needle, it is evident that if desired some other portion of the fiber itself could be formed into a point for the purpose of reproducing the sound and thereby, by the use of points of varying degree of hardness and resiliency, considerably varying the quality of tone reproduced.

The main purpose of my invention is the production of a needle of a vegetable growth, regardless of the shape or cross-section of the same.

The ordinary record of talking machines of the Victor type consists in a hard rubber disk, the record of sound being made through the medium of a spiral groove extending from the outer portion of the disk toward the center, and continuing as far therein as necessary. These grooves are V-shaped, and so far as appears to the naked eye, consist in parallel grooves. When these grooves are looked at through a microscope, it appears that the adjacent coils of the spiral are in no sense uniform, but the spiral itself is really a series of sinuous curves. The grooves are of practically a uniform depth, the variation in sound, tone, timbre, pitch, etc., being caused by the variations in the contour of the side walls of the groove. This being the case, it is at once apparent that in order to accurately reproduce the sound, it is necessary to have

the stylus or reproducing needle follow the exact line of the sides of the grooves. In the use of the ordinary metallic steel needle having a sharp point, the operative point of the needle only bears against the bottom of the groove, and in the event that the record has extreme variation resulting in sharp bends or turns in the sinuous grooves, the point of the needle is quite apt, instead of accurately following the groove, to jump across the groove at these points, causing breaks in the sound. By the use of my device, not only does the point of the stylus follow the bottom of the groove, but also the edges of the stylus pass along approximately the entire surface of the sides of the grooves, thus accurately and faithfully reproducing the sound. I have found that the best results are attained by the use of needles of a square or triangular cross-section, as these needles more accurately fit the curves in the ordinary record. In any event, however, the edges of the needle always bear against the sides of the groove at two or more points, regardless of the fact whether the point itself travels in the bottom groove or not.

In the use of the talking machine, the reproducing needle exclusively used is steel, and the needles themselves are inexpensive. The needles are very much harder than the record disks, and they, of course, wear the disk to such an extent that after a record has been played for a few times, the nicer gradations of tone are lost. It is found in practice that after a record has been played fifteen or twenty times, it becomes absolutely valueless as an expression of fine music, although it may be used an indefinite number of times by persons who have not a musical ear and cannot notice the difference in tone. By the use of my improved needle, however, which is of a less degree of hardness than the record itself, it is possible to use the same record several hundred times without any appreciable difference in the tone of the production. This fact gives a great value to my device, as the records of the finest singers and musical productions are quite expensive, and if it becomes necessary to replace them after they have been used a few times, it necessitates a large outlay of money. By the use of my device, however, which is also inexpensive, the needle after being used for one record may be thrown away and a new needle put in place, and the record remain in as good condition as before being played.

I claim only the use of my device as a reproducing needle or stylus, the device being incapable for use as a cutting or recording stylus.

I claim:

1. A reproducing needle formed from vegetable fiber, said fiber comprising a laminated structure with layers of different degrees of hardness.
2. A reproducing needle formed from vegetable fiber, said fiber comprising a laminated structure with layers

of different degrees of hardness, one end of said needle terminating in an angularly disposed portion.

3. A reproducing needle formed from vegetable fiber having a thin shell on one side thereof, comprising a tough outer portion, the balance of said needle comprising a portion of a less degree of hardness.

4. A reproducing needle formed from vegetable fiber having a thin shell on one side thereof, comprising a tough outer portion, the balance of said needle comprising a portion of a less degree of hardness, a section of said latter portion being cut away leaving the thin shell forming an angularly disposed point adapted to follow the undulations in the disk record.

5. A reproducing needle formed from layers of vegetable fiber of varying degrees of hardness.

6. A reproducing needle formed from layers of vegetable fiber of varying degrees of hardness, one end of said needle being cut away to form an angularly disposed point adapted to follow the undulations of the record disk.

7. A reproducing needle formed from bamboo fiber, the outer shell of said bamboo forming one side of said needle.

8. A reproducing needle formed from bamboo fiber, the outer shell of said bamboo forming one side of said needle, a portion of said fiber being cut away longitudinally, forming an angularly disposed point adapted to follow the undulations in the record disk.

9. A reproducing needle formed from the outer shell of bamboo fiber, of a substantially rectangular cross-section, one end of said needle being cut away longitudinally, and the resulting end being cut transversely, forming an angularly disposed point adapted to follow the undulations of the sound record.

10. A reproducer for talking machines comprising a needle formed from a vegetable growth and having an angular cross-section, the operative portion of said needle consisting of the edges formed between adjacent sides and the end of the needle.

11. A reproducing needle comprising a strip of wood, of a triangular cross-section, the operative portion of said needle being the edges formed by the meeting of adjacent sides and the end of the needle.

12. A reproducing needle comprising a wooden pin, of an angular cross-section cut off at the end and adapted to enter within and bear against the sides of the grooves in a record disk.

13. In a talking machine, the combination with a reproducer, of a record disk, and a reproducing needle formed from a vegetable growth and having an angular cross-section, the operative portion of said needle consisting of the edges formed between adjacent sides and the end.

14. In a talking machine, the combination with a reproducer, of a record disk, and a reproducing needle formed from wood, of an angular cross-section cut off at the end and adapted to enter within and bear against the sides of the groove in the record disk.

15. In a talking machine, the combination with a reproducer, of a record disk, and a reproducing needle formed from bamboo fiber, the outer shell of said bamboo forming one side of said needle.

Signed by me at Chicago, Cook county, Illinois, this 2nd day of July, 1906.

FREDERICK D. HALL.

Witnesses:

F. H. DRURY,
ALBERT J. SAUSER.

No. 870,961.

PATENTED NOV. 12, 1907.

A. HOFFMAN.
MULTOGRAM RECORD.
APPLICATION FILED JAN. 7, 1907.

Fig. 1.

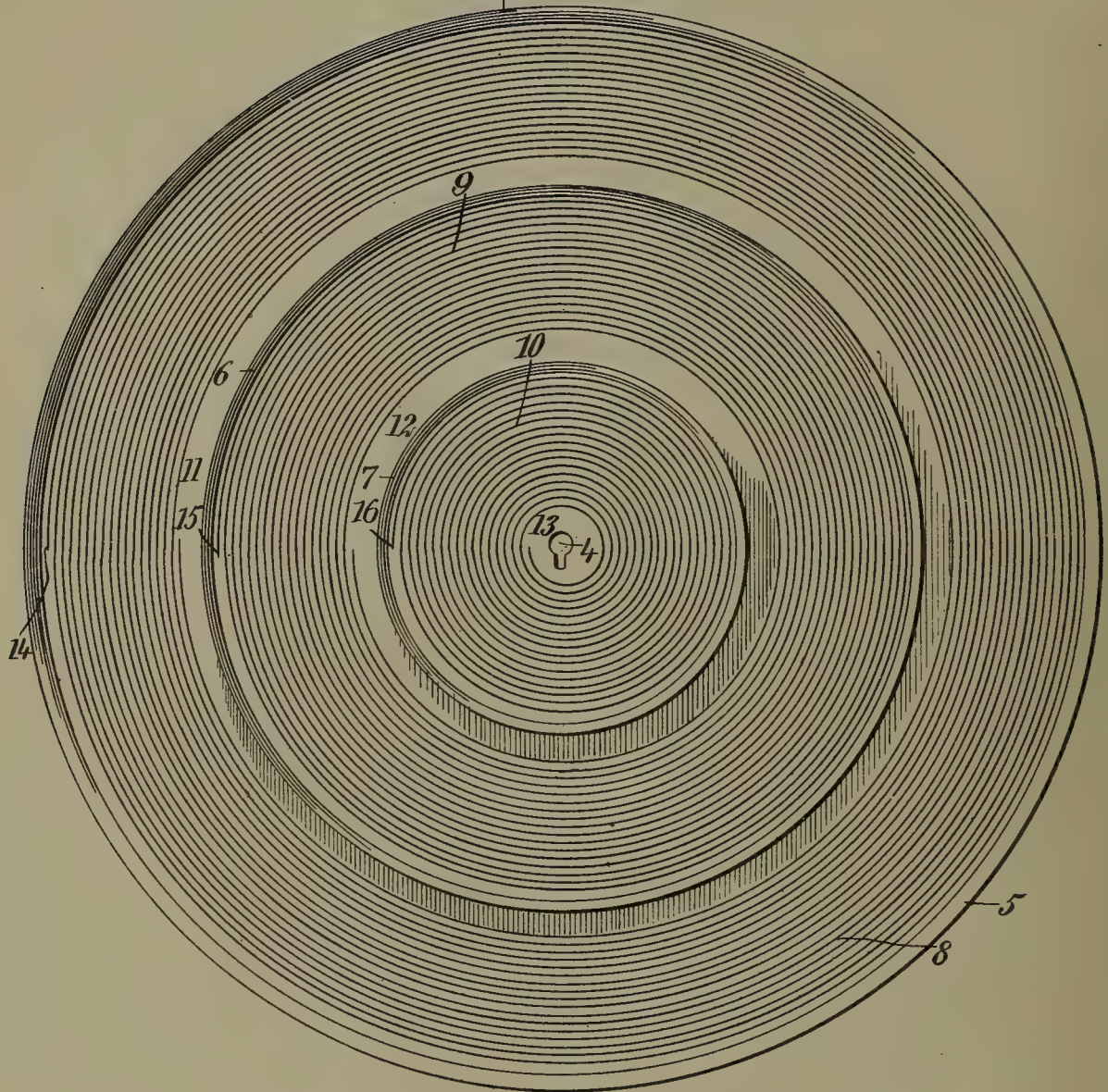
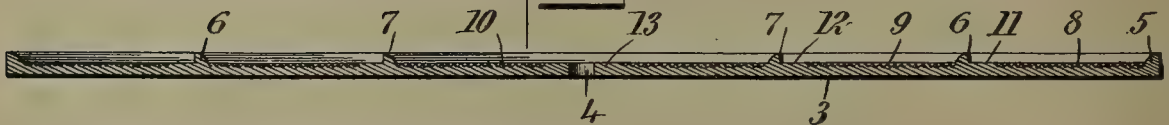


Fig. 2.



WITNESSES

H. J. Dieterich
Walton Harrison

INVENTOR

August Hoffman
BY *Mum & Co*

ATTORNEYS

UNITED STATES PATENT OFFICE.

AUGUST HOFFMAN, OF NEW YORK, N. Y.

MULTOGRAM RECORD.

No. 870,961.

Specification of Letters Patent.

Patented Nov. 12, 1907.

Application filed January 7, 1907. Serial No. 351,140.

To all whom it may concern:

Be it known that I, AUGUST HOFFMAN, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State
5 of New York, have invented a new and Improved Multogram Record, of which the following is a full, clear, and exact description.

My invention relates to records used for talking machines, my more particular object being to provide a
10 record with a multiplicity of record tracks for the purpose of increasing the amplitude and volume of the sound vibrations.

My invention further relates to means for separating the various record tracks from each other, so as to pre-
15 vent a stylus from one of these record tracks moving into another.

My invention further relates to means for increasing the physical strength of the record and for protecting the record track against injury when the record is
20 handled or shipped.

My invention further relates to providing the revoluble record member with improved means, whereby the operator is made aware of the proper portions of the revoluble member upon which to place the stylus
25 needles in order to bring into registry the various record tracks.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts
30 in both figures.

Figure 1 is a plan view of a disk-record embodying my improvements; and Fig. 2 is a central cross-section through the same, showing the form and disposition of the annular beads used for strengthening the record
35 and for protecting the record-tracks.

The record is shown at 3 and is provided with a central aperture 4 having the form of a key-hole slot. The stem or spindle of the talking-machine is of a conformity mating that of the key-hole slot, and fits neatly
40 thereinto so as to prevent any lost motion as between the stem or spindle and the disk. A number of annular beads 5, 6, 7, integral with the disk 3, are disposed concentrically thereupon and have, in cross-section, the forms indicated in Fig. 2.

A number of separate record-tracks 8, 9, 10 are spaced apart and disposed concentrically, each record-track being inside of a bead 5, 6, 7. These record-tracks are of the usual spiral form and are exact duplicates of each other in so far as the acoustical effect is
45 concerned. Inside of each record-track 8, 9, 10 is an annular space 11, 12, 13 which, for the purpose of convenience, I designate as an "idle" space.

It will be noted that each bead 5, 6, 7 is provided with a beveled surface or in other words that its top sur-

face slopes downwardly and inwardly. The purpose
55 of this arrangement is to provide for guiding the several stylus needles into the proper alinement with the outer ends of the several record-tracks. The beads 5, 6, 7 thus serve as distinguishing marks whereby the oper-
60 ator can judge with great exactness the several locations which should be occupied by the stylus needles. In practice, all that is necessary is for the operator to place approximately in position the several stylus
needles so that the latter, upon engaging the beveled surface of the beads 5, 6, 7, glide downwardly and into
65 proper position, to simultaneously engage the outer ends of the several record-tracks when the disk is set in motion.

In making the record above described, the record-tracks 8, 9, 10 are so arranged that the parts thereof
70 representing the same sound are in alinement with each other. This can be conveniently done by forming the record-tracks by the action of a number of different stylus needles acting simultaneously, there being as
many needles as there are record-tracks 8, 9, 10 to be
75 made. If desired, a master record can be made and other records reproduced therefrom.

In order to use the completed record it is placed upon the machine, the key-hole slot 4 being fitted over the stem or spindle of similar shape, as above described, and
80 this stem is set in motion in the usual manner.

A number of stylus needles corresponding to the number of record-tracks 8, 9, 10 is now brought into use, each needle resting upon one of these record-tracks. The needles may be started from the outer ends of the
85 tracks and moved gradually inward. When each needle finishes its work it is released by its record-track 8, 9 or 10, and then lodges against one or the other of the annular beads 5, 6, 7; no matter how long the disk now turns, no needle can do any damage nor can there be
90 any admixture of sounds due to a needle operating upon the wrong record.

It will be observed that the several record-tracks 8, 9, 10 begin outwardly at the points 14, 15, 16, these points being substantially in alinement with each other
95 with reference to an imaginary line passing radially outward from the center of the disk. This is to stop all of the various records at the same instant and to insure that various parts of the several records, related acoustically to each other, occupy the same position rela-
100 tively to imaginary lines passing radially outward from the center. It will thus be noted that in all of the records the parts which are acoustically related are in alinement with each other, and this is essential in order that sounds controlled by the various record-tracks
105 shall be made simultaneously.

As the record-tracks are in registry with each other in the acoustical sense of the expression, and as the sounds

reproduced from each record-track are duplicates of sounds represented simultaneously from the other record-tracks, it follows that the sounds are made considerably louder and clearer. It will also be noted that the wear and tear attending this increased volume of sound, upon any part of any record-track, is no greater than usual. The destruction of any part of the record need not be any greater than in the ordinary system.

I do not limit myself to the use of a disk, for the reason that any known equivalent therefor may be employed, without departing from the spirit of my invention.

Having thus described my invention I claim as new and desire to secure by Letters Patent:

1. A multogram record, comprising a revoluble member provided with a plurality of record tracks in acoustical registry with each other and further provided with raised portions disposed intermediate said record tracks.

2. A multogram record, comprising a member provided with a plurality of record tracks, and further provided with a raised portion disposed intermediate said record tracks for protecting the latter from injury.

3. A multogram record, comprising a revoluble disk provided with record tracks, and further provided with raised portions disposed intermediate said record tracks.

4. A multogram record, comprising a revoluble disk provided with annular beads integral therewith and disposed concentrically, and further provided with record tracks disposed intermediate of said annular beads.

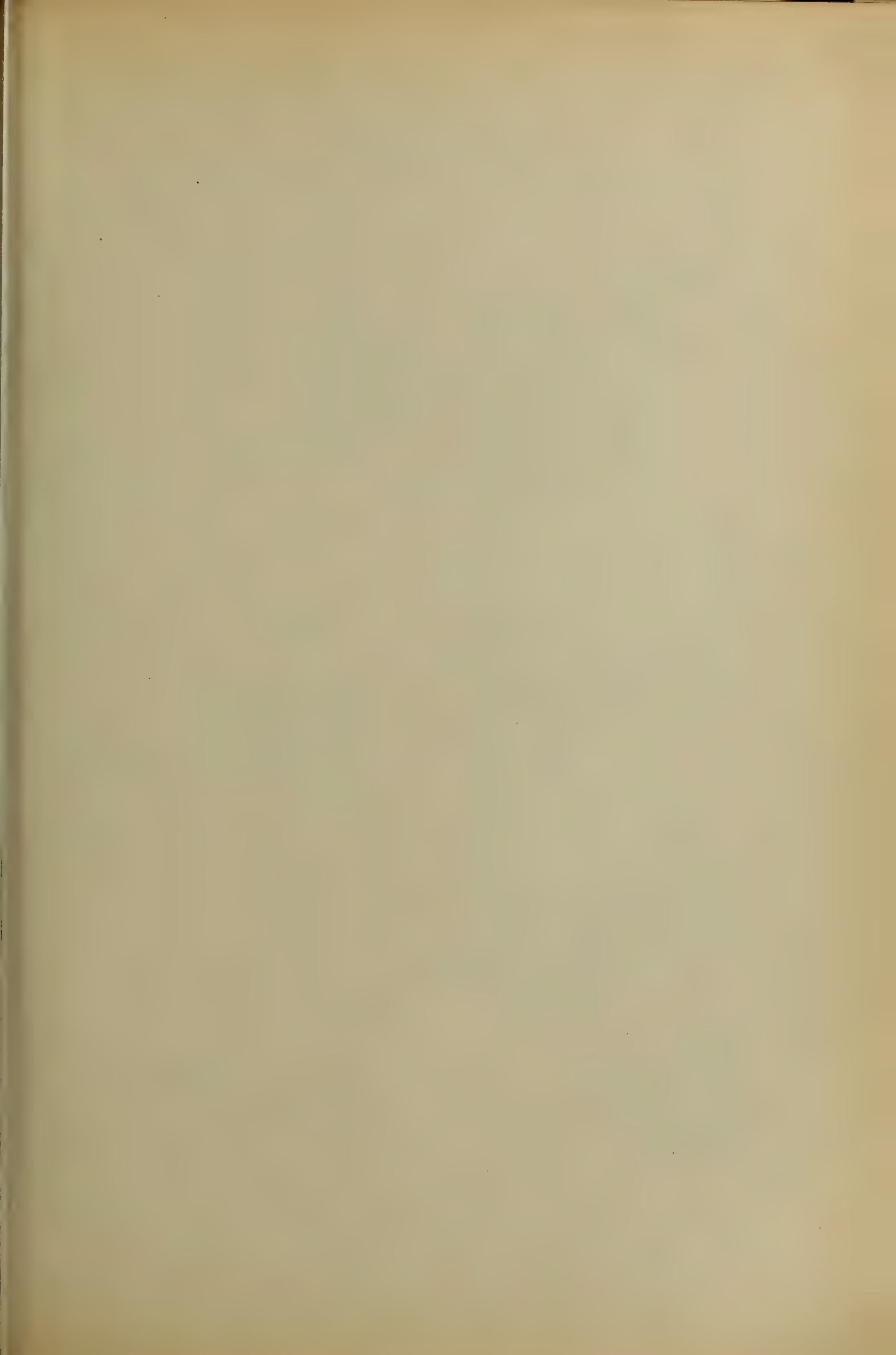
5. A multogram record, comprising a revoluble disk provided with a plurality of record tracks disposed concentrically, and further provided with an annular bead disposed intermediate said record tracks.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

AUGUST HOFFMAN.

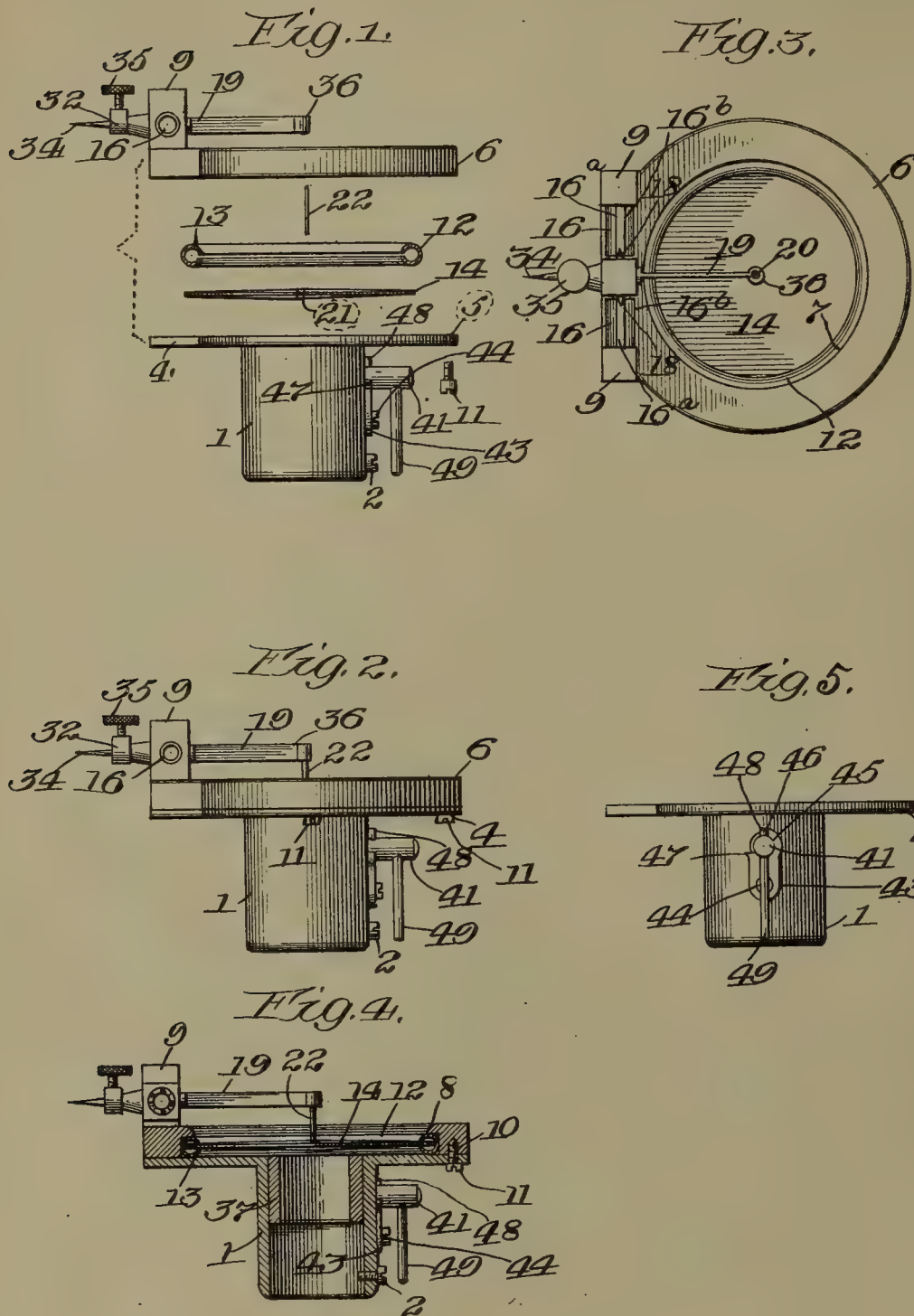
Witnesses:

WALTON HARRISON,
EVERARD B. MARSHALL.



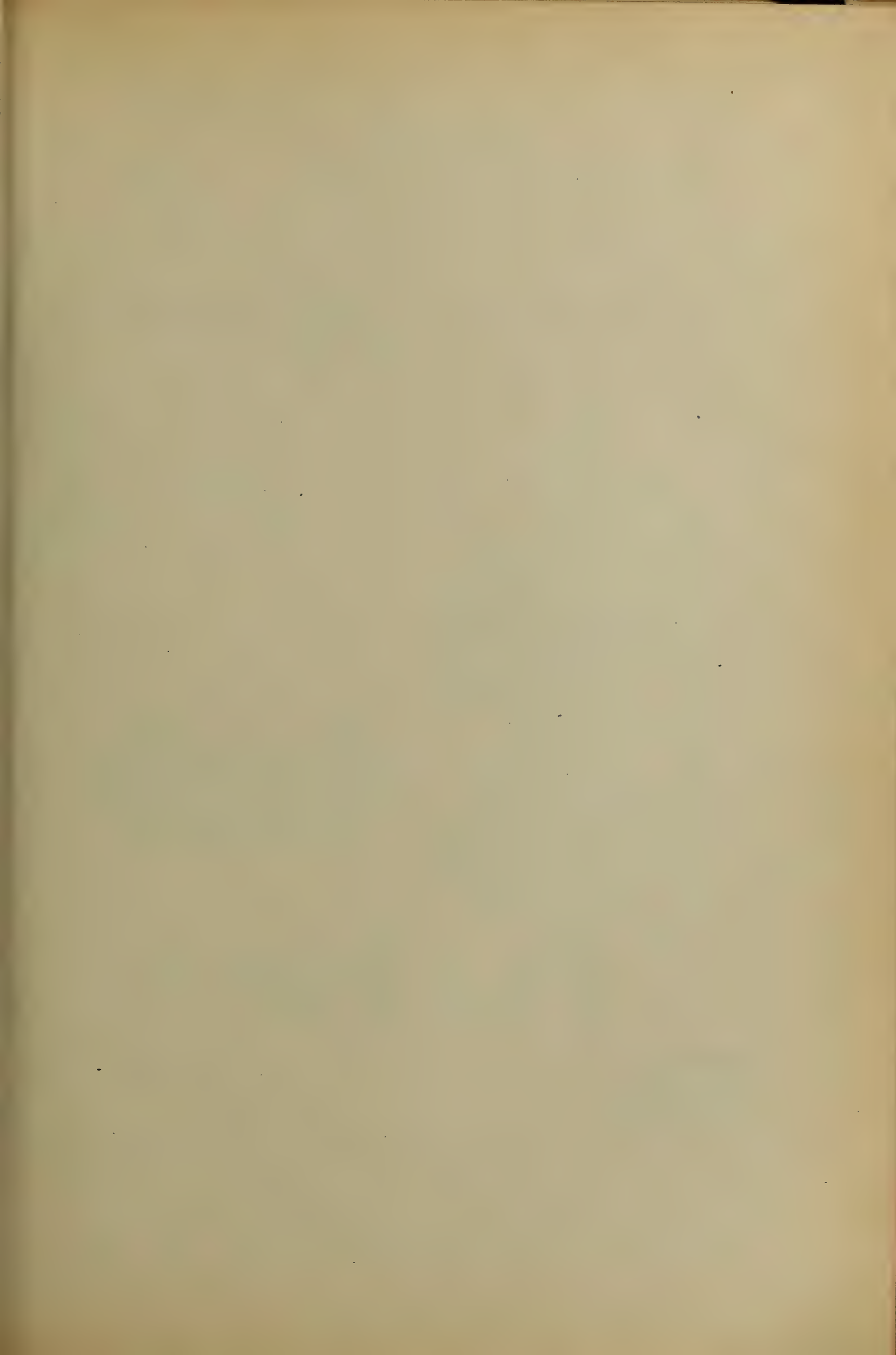
C. A. SMITH.
SOUND REPRODUCING HEAD.
APPLICATION FILED FEB. 28, 1906.

2 SHEETS—SHEET 1.



Witnesses:
O. H. Merrill
Em. Patterson.

Inventor:
Curtis A. Smith
by Benj. T. Rorabacher
Atty



C. A. SMITH.
SOUND REPRODUCING HEAD.
APPLICATION FILED FEB. 28, 1906.

2 SHEETS—SHEET 2.

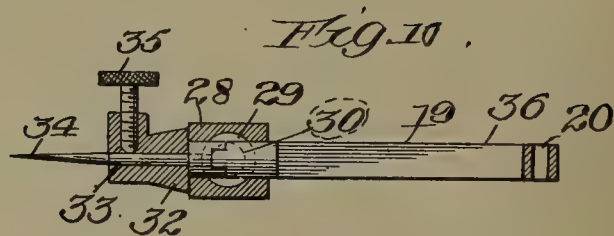


Fig. 11.

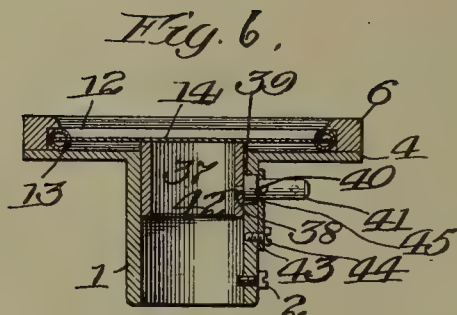
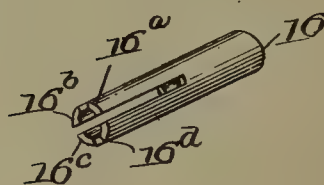


Fig. 8.

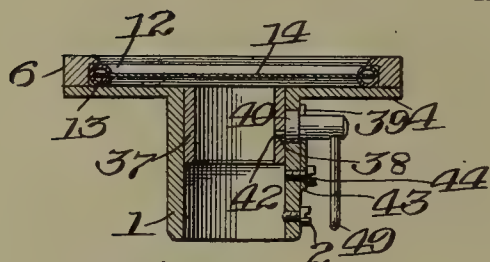


Fig. 7.

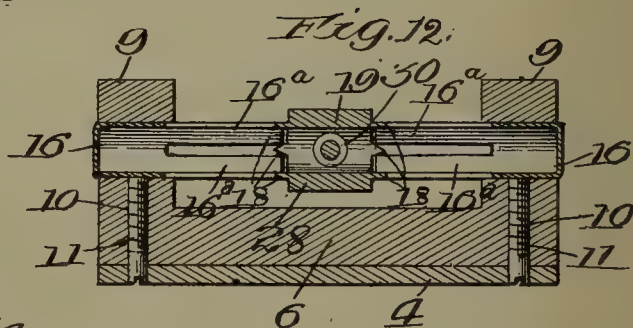
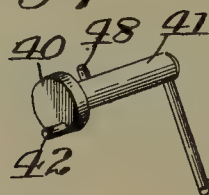
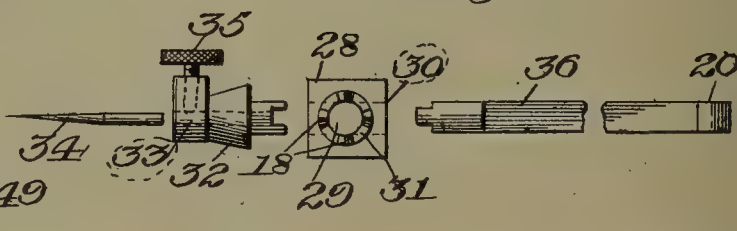


Fig. 9.



Witnesses:
O. W. Bennett
Emil Peterson

Inventor:
Curtis A. Smith.

by Benj. T. Roodhouse
Att'y

UNITED STATES PATENT OFFICE.

CURTIS A. SMITH, OF ELGIN, ILLINOIS.

SOUND-REPRODUCING HEAD.

No. 871,000.

Specification of Letters Patent.

Patented Nov. 12, 1907.

Application filed February 28, 1906. Serial No. 303,393.

To all whom it may concern:

Be it known that I, CURTIS A. SMITH, a citizen of the United States, residing at Elgin, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Sound-Reproducing Heads, of which the following is a specification.

My present invention relates to improvements in sound reproducing heads for sound reproducing machines, and has for its object the production of a head wherein there are means for controlling the volume of sound delivered to the audience.

A further object of my invention is the production of a simplified means for providing a fulcrum for said stylus arm.

To the attainment of these various objects my invention consists of the new and novel structure and combination of parts as will presently appear.

In the drawings:—Figure 1 is a side elevation of the various parts of my sound head separated but in position for assembly. Fig. 2 is an elevation of the assembled sound head. Fig. 3 is a top plan view of my sound head. Fig. 4 is a sectional view of the assembled sound head, taken on line X X of Fig. 3. Figs. 5, 6, 7 and 8 are detail views showing the construction of my new muting device. Fig. 9 shows the various parts going into the construction of my new lever or stylus arm. Fig. 10 is a sectional view showing the various parts in Fig. 9 assembled to form the stylus arm or lever. Fig. 11 is an enlarged perspective view of one of the members forming the bearing or fulcrum for the stylus arm or lever. Fig. 12 is a vertical sectional view through the stylus arm and its bearing assembled with the head.

The numeral 1 designates the collar which fits snugly over the sound conduit of a sound reproducing machine.

2 designates a stop which serves to secure the proper positioning of the sound head upon the sound conduit.

The numeral 4 designates a plate integral with the collar 1 which forms the back of my reproducing head.

Through the plate 4 are the screw holes 5.

The numerals 6 designate the top plate of my sound head, and is provided with the round central aperture 7, the annular shoulder 8, the posts or pillars 9, and the screw holes 10 by means of which through the agency of the screws 11 it is attached to the plate 4. Between the plates 4 and 6 and contiguous with the annular shoulder 8 is mounted the split tube 12, the split therein being designated by the numeral 13. Extending into the tube 12 through the split 13 is mounted the diaphragm 14.

In the holes 15 in the pillars 9 are mounted the pieces 16, which I prefer to make of hollow tubes, the inner ends of which are split at right angles to form the fingers 16^a, 16^b, 16^c, and 16^d, the ends of which said fingers, as shown in Fig. 11 at 17, engage the faces of the triangular projection 18 of the stylus arm or lever 19.

The inner end 36 of the stylus arm or lever 19 is perforated, as shown at 20 in Figs. 9 and 10. A like perforation 21 is provided in the center of the diaphragm. The ends of the piece 22, which I make of a flexible fiber, are inserted into the perforations 20 and 21, and properly secured with wax, cement, or other appropriate means, thus binding the diaphragm 14 and the stylus arm 19 firmly together.

When a proper adjustment is secured between the stylus arm 19 and the diaphragm 14, and between the stylus arm and the pieces 16, the said pieces 16 are secured and maintained in their proper position by means of the screws 11 working in the holes 10 as clearly shown in Fig. 12.

My new stylus arm or lever 19 consists of the hub 28 which I make in the form of a cube. Through the hub 28 and at right angles to each other I provide the holes 29 and 30. Into the hole 29 is inserted the tube 31 whose ends are each provided with the four triangular projections 18, the faces of which contact with and engage the fingers 16^a, 16^b, 16^c and 16^d. In one end of the hole 30 is introduced the piece 32 which is provided upon its outer end with the chamber 33 for the reception of the stylus 34, and the milled headed screw 35 for securely clamping the stylus in its chamber. In the other end of the hole 30 is introduced the inner end 36 of the stylus arm. When the parts are assembled as above described, they can be readily sweated together with a little solder. The parts as above described can all be made with automatic machinery, thereby permitting of a considerable economy in manufacture.

My improved muting device is constructed as follows: In the collar 1 is slidingly mounted the hollow cylinder 37 having in its wall the conical aperture 38. Adjacent to the aperture 38 in the wall of the collar 1 is provided the cylindrical aperture 39. In the aperture 39 is mounted the short shaft 40, having the diminished end 41 projecting beyond the outer surface of the collar 1. On the inner end of the shaft 40, to one side of the center or eccentrically, is mounted the stud 42 which engages with the aperture 38 in the cylinder 37. It is obvious that by revolving the shaft 40, the eccentrically mounted stud 42 working in its aperture or bearing 38 will force the cylinder 37 forward and backward in the collar 1. The hollow cylinder 37 is so positioned that when it is furthestmost in the collar its outer edge lies flush with the inner surface of the plate 4. Any turn that is given to the shaft 40 forces the inner end of the hollow cylinder 37 nearer to the vibrating diaphragm 14, thereby shutting off the sound waves rising from the edges of the diaphragm and reducing the volume of sound delivered to the audience. For the purpose of maintaining the shaft 40 in place, I provide upon the outer surface of the collar 1 the plate 43 which is attached thereto by

means of the screw 44. The plate 43 is provided with the hole 45 of sufficient diameter to accommodate the diminished end 41 of the shaft 40. The hole 45 is further cut away to provide the shoulders 46 and 47.

5 Upon the diminished end 41 of the shaft 40 are the stop pin 48, which works between the shoulders 46 and 47 and by means of which the revolution of the shaft 40 is limited, and the crank or pin 49 by means of which the shaft 40 is revolved.

10 Having described my invention, it is evident that I provide a sound head of new and extremely simple construction for the more perfect reproduction and control of sound.

What I claim as new and desire to secure by Letters
15 Patent is:—

1. A pivotal support for a stylus arm having a member provided with a plurality of axially extending parallel spring fingers and means for engaging the ends of said member.

20 2. In combination with a sound reproducing head having a tube running from the diaphragm chamber, a mute consisting of a tubular body movably mounted in said tube and adapted to be moved to project into said diaphragm chamber, and means for moving and adjusting

25 said mute at different distances from the vibrating diaphragm, said means extending through the walls of said tube and adapted to be manipulated from the exterior thereof.

3. In combination with a sound reproducing head, a
30 mute consisting of a tube mounted in the passage for the escape of the sound, and an eccentric in engagement with said tube and operable to advance said tube towards and with draw it from the diaphragm.

4. In combination with a sound reproducing head, a
35 mute consisting of a tube mounted in the opening for the

escape of the sound, a shaft carrying an eccentric, said tube being operably connected with said eccentric and means for limiting the revolutions of the shaft.

5. In a sound reproducing head a stylus arm having angular projections, a spring fulcrum consisting of two
40 pieces whose inner portions are split at right angles, the inner end of the divisions formed thereby contacting with and engaging the faces of said angular projections.

6. In sound heads for sound reproducing machines, pieces carried in adjustable assembly with said sound
45 head the inner portion of said pieces being split in sections, a stylus arm and projections carried upon each side of said stylus arm for engaging said sections.

7. A support for stylus arms in sound reproducing machines, comprising a plurality of axially extending fingers,
50 means for frictionally engaging and bending said fingers to produce tension and a stylus arm.

8. A fulcrum for stylus arms in sound reproducing machines consisting of two pieces each with a plurality of
55 fingers to engage the stylus arm.

9. A fulcrum for stylus arms in sound reproducing machines consisting of two pieces the ends of which are divided into a plurality of fingers, means upon the stylus
60 arm for engaging said fingers, and means for connecting said pieces with the sound head.

10. A sound box comprising rear and side walls, a diaphragm therein, a sound box tube projecting from said rear wall and a sound modifier consisting of a tube movable within said sound box tube and adjustable into and out of
65 close proximity to said diaphragm and means carried by said sound box and exterior thereof to adjust said sound modifier.

In testimony whereof I affix my signature in presence of two witnesses.

CURTIS A. SMITH.

Witnesses:

BENJ. T. ROODHOUSE,
E. M. PATTERSON.

No. 871,370.

PATENTED NOV. 19, 1907.

W. I. SHERWOOD.
SOUND REPRODUCING RECORD DISK.
APPLICATION FILED JAN. 3, 1907.

Fig. 1.

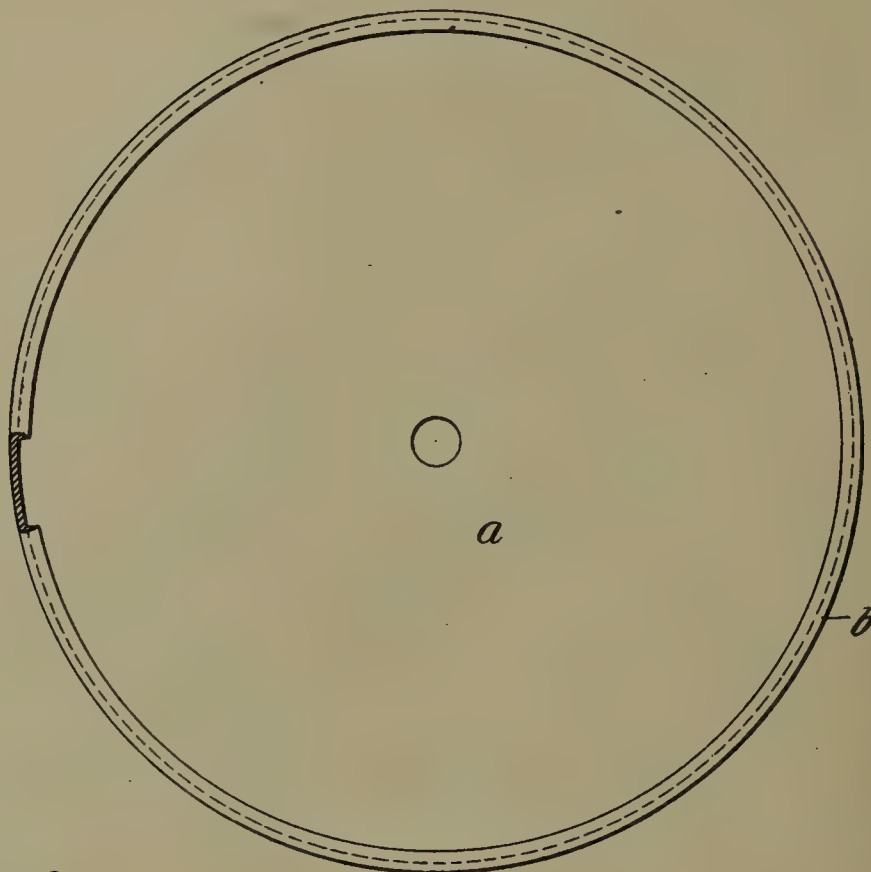


Fig. 2.



Fig. 3.

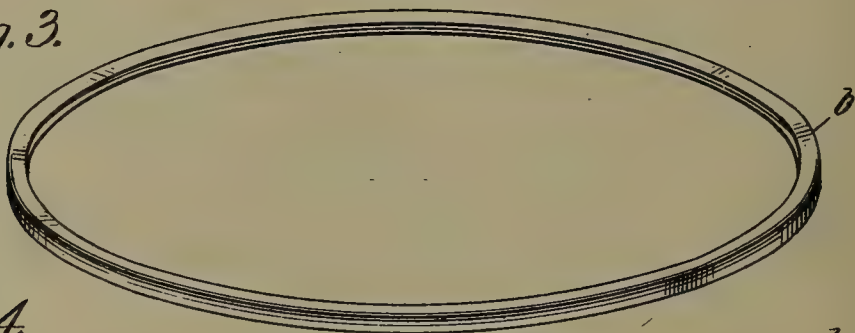
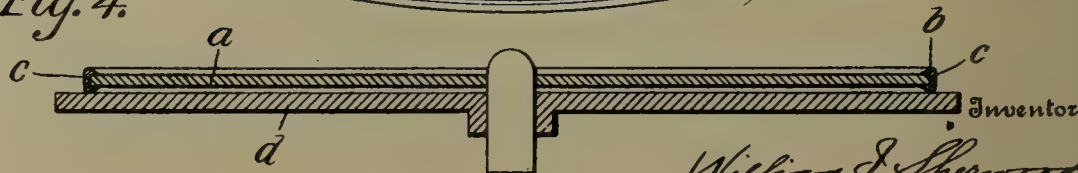


Fig. 4.



William I. Sherwood

Witnesses
Robert H. Wessinger
Raymond Le Blanc.

By Geo. L. Wheelock

Attorney

UNITED STATES PATENT OFFICE.

WILLIAM I. SHERWOOD, OF NEW YORK, N. Y., ASSIGNOR TO PHONOGRAPHIC MUSIC CO., OF
BROOKLYN, NEW YORK, A CORPORATION OF NEW YORK.

SOUND-REPRODUCING RECORD-DISK.

No. 871,370.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Application filed January 3, 1907. Serial No. 350,613.

To all whom it may concern:

Be it known that I, WILLIAM I. SHERWOOD, a citizen of the United States, residing at New York, borough of Manhattan, and State of New York, have invented certain new and useful Improvements in Sound-Reproducing Record-Disks, of which the following is a specification.

My invention relates to improvements in sound reproducing record disks of talking machines, whether separate from or combined with the turn table of the machine; and the objects of the invention are mainly to provide a serviceable, reliable and characteristic record disk, and to improve the effects intended to be produced.

With these main ends in view, my invention consists of certain features of construction and combinations of parts to be hereinafter described and then claimed, with reference to the preferred form of the invention shown in the accompanying drawings, and in which

Figure 1 is a plan view of my improved record disk, part broken away. Fig. 2 is a diametrical transverse section thereof. Fig. 3 is a perspective view of the peripheral ring of the disk detached. Fig. 4 is a transverse section of a turn table of a talking machine showing my improved disk resting thereon.

Referring to the drawings, the record disk *a* of a talking or sound reproducing machine is shown as having applied to its edge a peripheral ring or hoop *b* of material softer than the disk to provide a friction surface. The material of the ring or hoop *b* is preferably rubber, having sufficient softness and resiliency to enable the ring to act in the nature of a cushion or pad. The body of the ring or hoop is shown as having a diameter which is greater than the thickness of the record disk, so that when the ring or hoop is applied to the edge of the disk, the same will bulge out or project from and beyond either surface of the disk. The inner periphery of the ring or hoop *b* is provided with a continuous groove *c* to receive the edge of the disk *a*. In this manner the ring or hoop is confined detachably upon the edge of the disk. The diameter of the elastic ring or hoop *b*, when removed from the disk, is preferably such that the distance between diametrically opposite portions of the bottom of the groove *c* will be less than the diameter of the disk, so that it is necessary to stretch

the peripheral hoop or band upon and over the peripheral edge of the disk so as to enter said edge into the recess.

When a record disk is applied to a talking machine for the purpose of reproducing sound, it usually rests upon a turn table, such as *d*. In the present invention the record disk *a*, *b*, does not throughout rest upon the turn table, but the bulging or protruding side portion of the ring or hoop *b* supports the record disk from the table.

Quite a number of advantages are incidental to my improvement, among which may be enumerated the following. The turn table carries the disk around surely and effectively by friction between the periphery of the disk and the table, thus overcoming slipping of the disk, or any movement of the disk out of time and irrespective of the speed to which the turn table is governed to run, thus assuring that the piece reproduced, if it be music, for instance, is at proper pitch. The side portion of the peripheral ring or hoop bulging or projecting beyond the plane of the sound reproducing surface, forms a stop for the stylus, and prevents it from being thrown by centrifugal force off the disk, as sometimes occurs, and interrupting the piece being produced. Also said bulging side portion of the ring or hoop forms an index or guiding line for starting the stylus. There is also the advantage of the cushioning effect, which particularly finds its usefulness when the sound reproducer is suddenly dropped upon the reproducing surface of the disk.

A great advantage over present record disks, is that, through my improvement, disks are protected from each other in transit, in handling, in racking, etc., which tends to injure the sound reproducing indentations of the disks, or to scratch the surface of the disk itself. The bulging side portions of the ring or hoop furnish a convenient hand-hold for grasping the record disk, especially in removing it from a rack and separating it from adjacent disks.

Record disks may conveniently be provided with rings or hoops of different colors, whereby one disk may be readily distinguished from another, when in a rack or in a pile.

Obviously the softer edgings of the disks may be permanently attached or applied, and they may be applied in a variety of

ways which will readily suggest themselves to those skilled in the art.

What I claim as new and of my invention is:

- 5 1. A sound reproducing record disk having a peripheral ring of soft material softer than the record disk.
2. A sound reproducing record disk having a soft peripheral ring removably applied
- 10 thereto and being softer than the record disk.
3. A sound reproducing record disk hav-

ing a soft peripheral ring provided with a recess in its inner periphery receiving the edge of the disk said ring being softer than the 15 record disk.

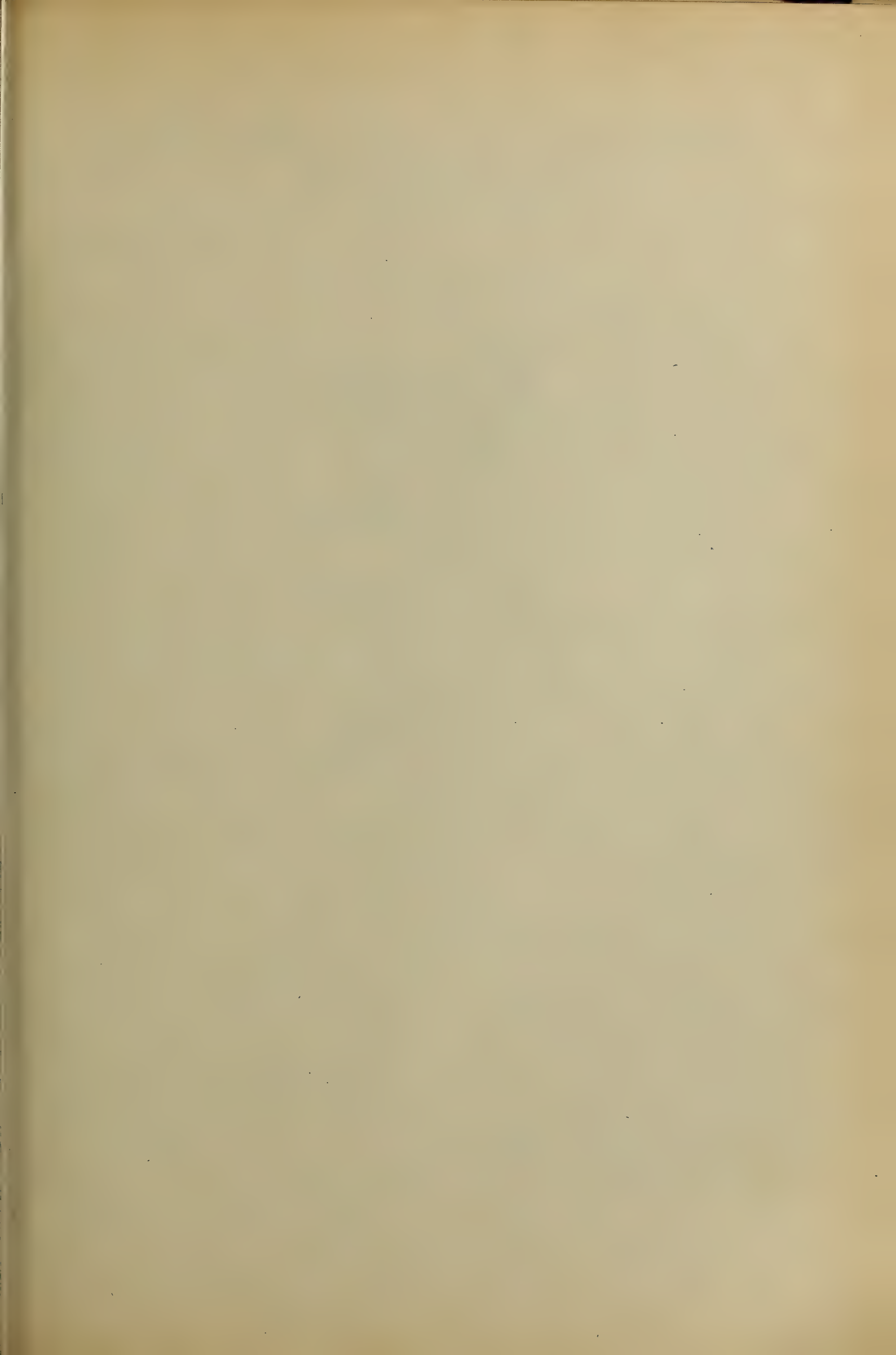
4. A sound reproducing record disk having an edging softer than the disk itself.

Signed at New York, N. Y. this 28th day of December 1906.

WILLIAM I. SHERWOOD.

Witnesses:

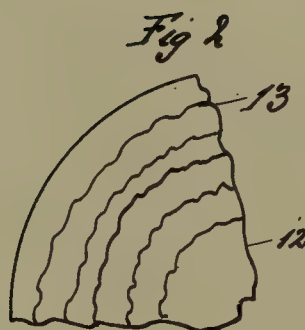
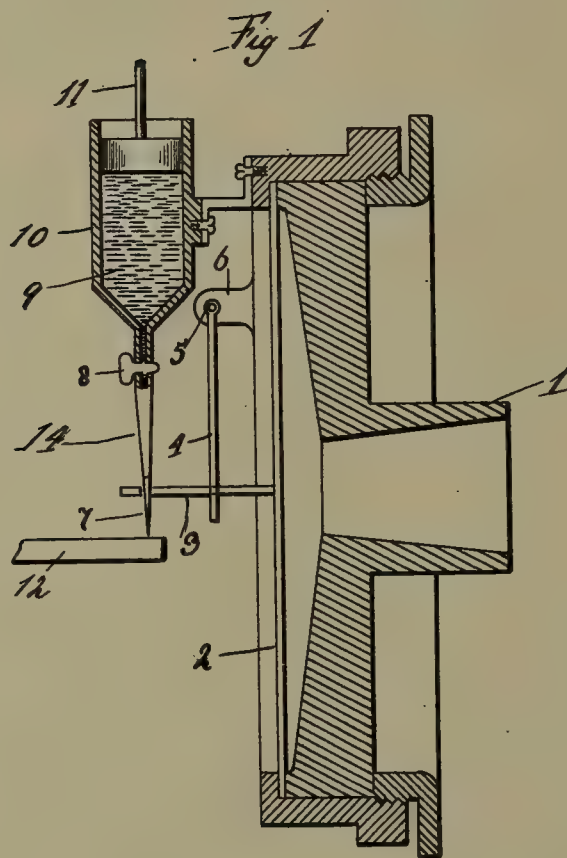
OLIVE B. KING,
GEO. L. WHEELOCK.



No. 871,511.

PATENTED NOV. 19, 1907.

I. KITSEE.
PRODUCTION OF SOUND RECORDS.
APPLICATION FILED MAY 17, 1907.



Witnesses

Mary C. Smith
Alex Rittenhouse

I. Kitsee

Inventor

UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA.

PRODUCTION OF SOUND-RECORDS.

No. 871,511.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Application filed May 17, 1907. Serial No. 374,213.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Production of Sound-Records, of which the following is a specification.

My invention relates to the production of sound records.

Most of the sound-records are to-day produced by what is called the "cutting-stylus", and the systems now employed differ from each other in that one reproduces the sound-waves by the depth of the cut and the others reproduce these sound-waves by removing an etch-resisting film on a solid plate. In all these cases a resistance is offered to the movements of the stylus, and through this resistance these movements are greatly retarded. The records therefore cannot reproduce the voice in its natural amplitude. It is the aim of my invention to obviate these difficulties.

As it is necessary to illustrate some means, whereby my invention may be carried out, I have illustrated in the accompanying drawing a simple arrangement to produce the undulatory line, it being understood that the details of the arrangement may differ without departing from the scope of my invention.

In the drawing, Figure 1 is a cross section of a recording mechanism attached to the vibrating diaphragm. Fig. 2 is a plan view of part of a record.

In Fig. 1, 1 is the mouth piece; and 2 the vibrating diaphragm connected to the guide 3. This guide is yieldingly guided by the lever 4 supported at 5 by the projection 6. 10 is a reservoir containing the fluid 9; 8 a valve to open or close the orifice of said reservoir; 11 are the means to force the fluid out of said reservoir; 14 is a flexible connection connecting the orifice 7 with the reservoir 10; 12 is the material adapted to have deposited thereon the opaque line; and 13 are the recording lines.

In experiments, I found that it is best to produce the line out of diluted ink of the variety known in commerce as "india ink" and generally used for the production of drawings. For the material on which the

line is deposited, I found that glass answers the purpose best. It is obvious that the glass plate has to be moved in the usual manner and I have not illustrated the means to move this plate, because such means are well known to persons versed in the art.

After the record is produced in the manner aforesaid, the plate is subjected, preferably, to what is known in the art as the "photo engraving process", whereby a negative may be produced in suitable metal and wherefrom the copies may then be reproduced in any desired manner.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The method of reproducing sound waves in permanent records, which consists in causing a fluid, opaque to the rays of light, to be deposited in accordance with the vibrations of a diaphragm actuated by said sound waves on a material transparent to said rays of light.

2. The method of producing sound records, which consists in causing to be deflected the flow of a fluid opaque to the rays of light, in accordance with the vibrations of a diaphragm, and causing the so deflected opaque fluid to be deposited on a solid surface transparent to said rays of light.

3. The method of producing sound records, which consists in causing a material, colored so as to be opaque to the rays of light to be deposited on a transparent surface, in accordance with the vibrations of a phonographic diaphragm, and causing then to be produced a photographic copy of said deposited material.

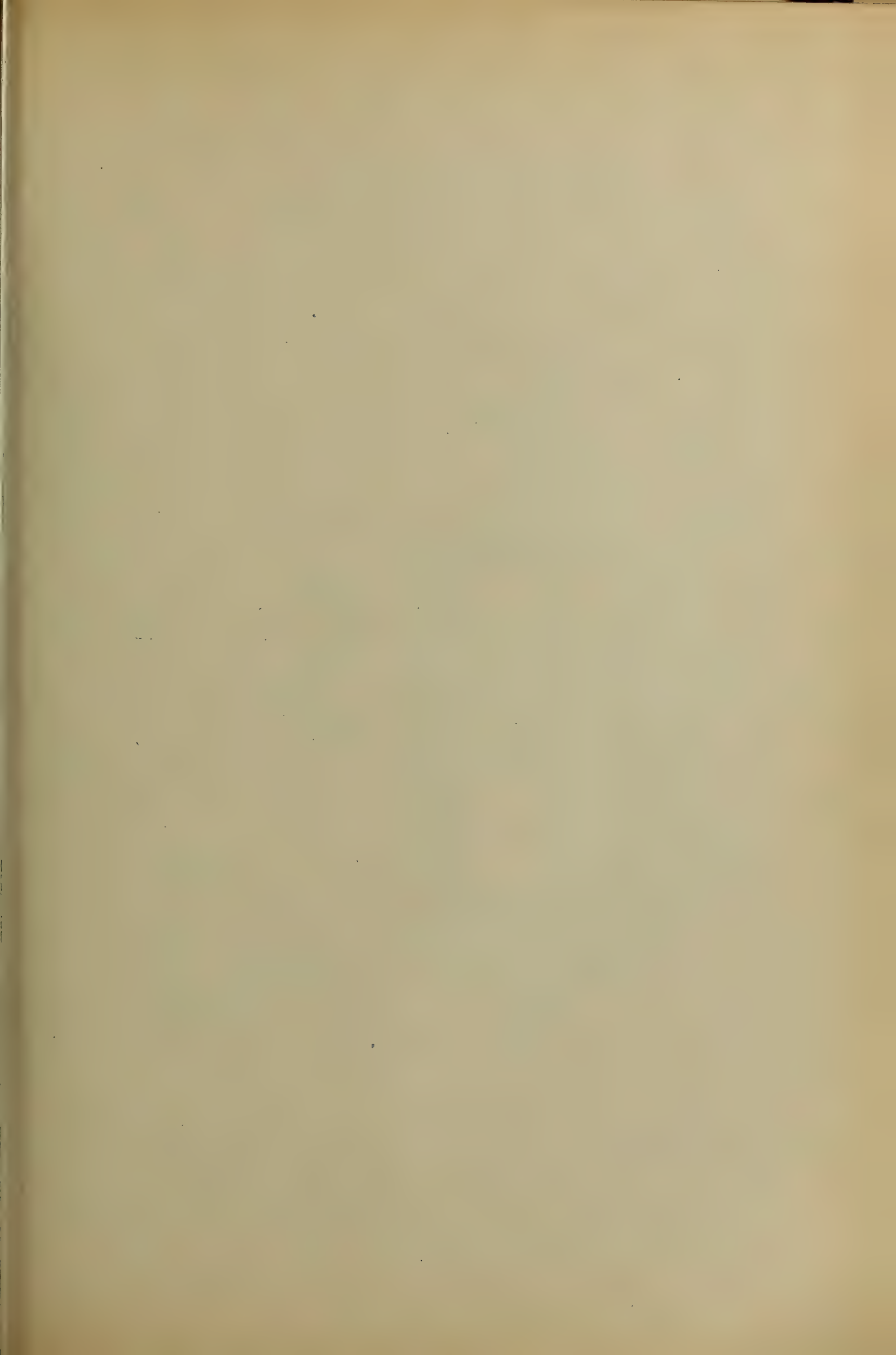
4. The method of producing sound records without actual contact of a stylus connected to the diaphragm, which consists in causing said stylus to guide the orifice of a reservoir containing an opaque fluid, causing said fluid to be deposited on the surface of a transparent material, and causing the so produced record to be reproduced with the aid of the photo-gravure process.

In testimony whereof I affix my signature in presence of two witnesses.

ISIDOR KITSEE.

Witnesses:

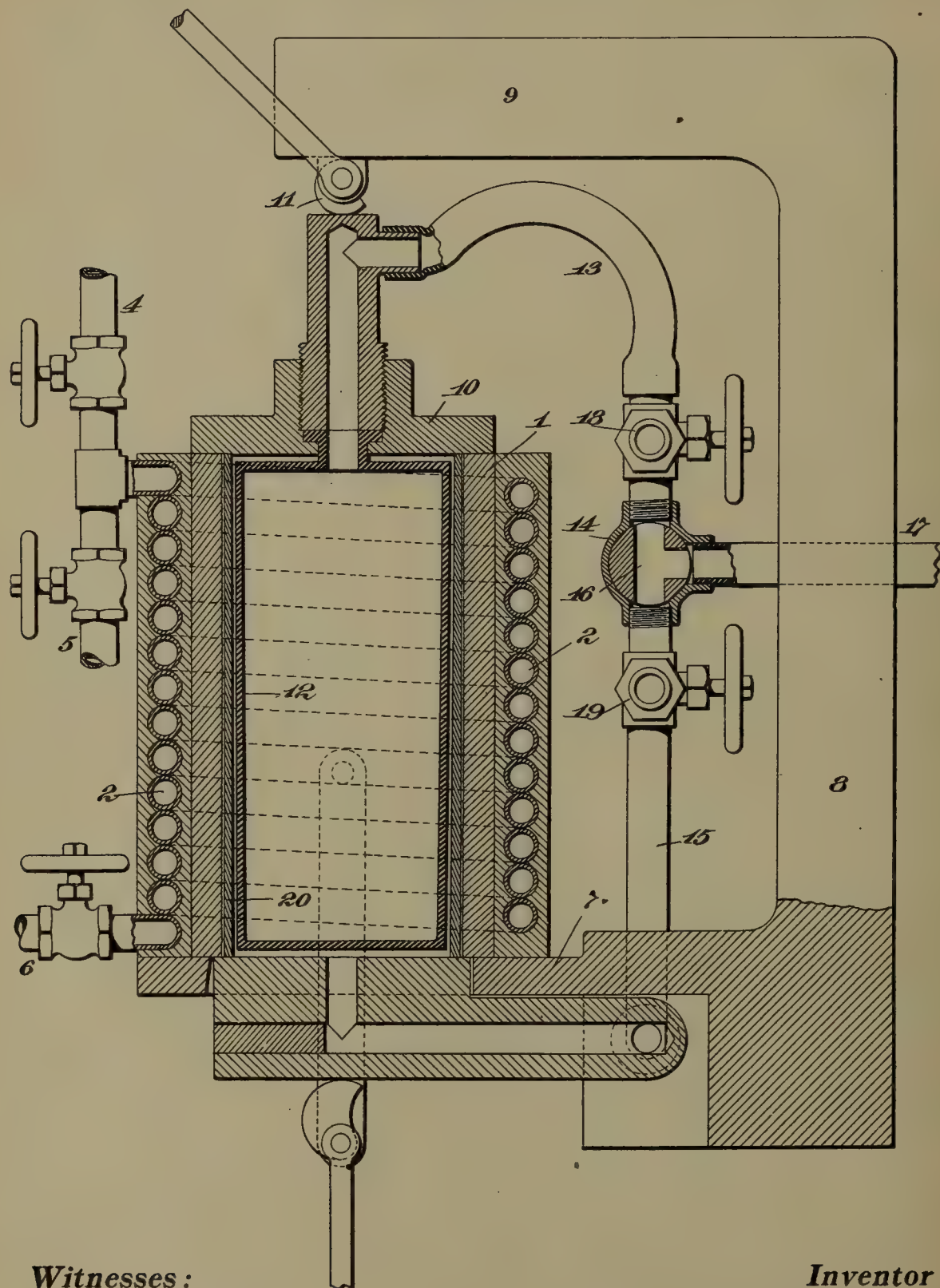
MARY C. SMITH,
ALVAH RITTENHOUSE.



No. 871,554.

PATENTED NOV. 19, 1907.

J. W. AYLSWORTH.
METHOD OF DUPLICATING SOUND RECORDS.
APPLICATION FILED DEC. 8, 1905.



Witnesses:

Delos Holden

Miss C. MacArthur

Inventor

Jonas W. Aylsworth
by Frank L. Ayer

Attorney

UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

METHOD OF DUPLICATING SOUND-RECORDS.

No. 871,554.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Application filed December 6, 1905. Serial No. 290,540.

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, residing at 223 Midland avenue, East Orange, county of Essex, and State of New Jersey, have invented a certain new and useful Method of Duplicating Sound-Records, of which the following is a specification.

My invention relates to an improved method for duplicating sound records from matrices or molds by the expansion of a blank, and is adapted particularly for the making of records from relatively hard material, such as hard rubber, celluloid and similar compositions, although the invention may be used for making records from wax-like compositions, such as those now employed in the art of making duplicate phonograph records by a molding operation.

The object of the invention is to provide a simple and effective method for the purpose.

In order that the invention may be better understood, attention is directed to the accompanying drawing, forming part of this specification, and in which I illustrate a sectional view of an apparatus suitable for carrying out my invention.

The matrix or mold 1 is of the common type now used in the art, being provided on its interior with a negative impression of the record to be duplicated and being of any desired thickness. Provision is made for alternately heating and cooling the matrix or mold, preferably by surrounding the same with a coil 2, embedded in a jacket of lead, or other fusible metal. Steam (saturated or super-heated) for heating the coil, or water for cooling the same, are admitted through the pipes 4 and 5 respectively, and having suitable controlling valves therein, as shown. The valved outlet 6, permits any water or condensed steam to be drawn off from the coil at the bottom thereof. The matrix or mold is seated on a suitable base 7, and may, if desired, be permanently connected to the same; said base is carried by a frame 8 having an upper member or arm 9. Engaging the top of the mold is a cap 10 adapted to be firmly clamped in place in any suitable way, as for example, by a cam 11, carried by the arm 9. The cap 10, is provided with a flexible expander 12, made preferably of rubber, adapted to fit within the matrix or mold, and to leave

sufficient space for the reception of the blank on which the record surface is to be impressed. Connected with the interior of the expander 12, is a flexible pipe 13, leading to the chamber 14 of the vacuum valve. A pipe 15 connects the interior of the matrix or mold with the chamber 14. The vacuum valve 16 is an ordinary three-way valve and when in the position shown, connects the vacuum pipe 17 with the pipes 13 and 15 so as to exhaust the air from the mold and from the interior of the expander 12. When the vacuum valve is moved 90 degrees clockwise, it connects the vacuum pipe 17 with the pipe 15 only, and when moved to a further extent of 90 degrees, it cuts off the vacuum pipe 17 entirely, as will be understood. The vacuum pipe 17 is connected to any suitable source of vacuum, preferably an ordinary exhausting pump.

To provide regularity and rapidity of operation, a reservoir is preferably interposed between the exhausting pump and the duplicating apparatus, so as to permit the necessary exhaustion to be quickly obtained, and also to permit a number of duplicating machines to be connected with the same reservoir, as will be understood.

A valved pipe 18 connects with the pipe 13 above the vacuum valve and may be open directly to the air or may be connected with a source of compressed air, as may be necessary when the materials to be duplicated are but slightly expansible. Another valve 19 below the vacuum valve permits atmospheric air to enter the pipe 15. The blank 20 may be made of any suitable material capable of being softened or rendered plastic or semi-fluid by heating (such as hard rubber, celluloid, shellac composition, or the ordinary wax-like materials of which duplicate phonograph records are now made) and of any desired thickness. By means of my invention, records can be effectively duplicated on extremely thin blanks, which can be subsequently mounted on any suitable and permanent support, as for instance, by making the blank slightly tapered, so as to engage the support frictionally. Or, instead, the blank may be a composite structure formed of a suitable base of paper, fabric, rubber composition, or similar material capable of moderate expansion without rupture, and carrying a coating of a smooth and sufficiently hard material (such as cel-

luloid or similar substance, capable of being softened by heat) on its outer surface. Preferably the bottom of the mold is constructed so as to swing downwardly as shown to permit the blank to be introduced, and the finished record to be withdrawn, suitable means being provided to rigidly lock the bottom in its closed position during the duplicating operation. The blank 20 is made very slightly smaller than the bore of the matrix or mold so as to be readily introduced therein surrounding the expander, as shown. The matrix or mold is now heated (or it may be heated before the blank is introduced) by admitting the steam to the coil 2 or in any other suitable way. This results in heating the blank so as to soften its outer face and permit it to readily take an impression.

During the heating of the blank, the vacuum valve 16 is operated to exhaust air from the interior of the expander 12, and also, from the interior of the mold, so as to equalize the pressure on the expansible walls of the expander. By thus applying a vacuum to the interior of the matrix or mold, I effectively exhaust any air, or gas, or moisture from between the blank and the record surface of the matrix, so that when the blank is expanded it will take a perfectly clear and sharp impression from the record surface. Furthermore, this exhaustion of the air film between the blank and matrix is effected without the necessity of sealing the ends of the blanks in any way and the result is obtained whether the blank is relatively thick or is very thin. The vacuum valve 16 is now moved clock-wise 90 degrees, so as to still maintain the exhaust connection to the pipe 15, and the valve of the pipe 18 is open to permit atmospheric air or compressed air to enter the expander 12, thereby expanding the flexible walls of the latter and forcing the blank intimately into engagement with the record surface. When the blanks are formed of material that is expanded with difficulty, or that softens only slightly, I preferably use compressed air in the expander, or superheated steam in the coil 2, or both, for effecting this operation, but with thin blanks of celluloid, or similar material, atmospheric pressure will be sufficient. After the blank has been thus expanded into engagement with the matrix and is held closely in such engagement by the inflation of the expander 12, I turn off the steam in the coil 2 and admit cold water to the same, so as to rapidly chill the matrix and also the surface of the record in contact therewith. This chilling takes place while the record is tightly compressed against the bore of the matrix, so that the material is set and becomes fixed while in such engagement. This results in a sharper and more permanent impression on the resulting duplicate

than would be secured if the setting of the material was brought about after detachment of the record from the mold. Preferably, before the record has been cooled entirely throughout, but after its surface has been set and hardened as explained, the vacuum valve 16 is moved to shut off the vacuum pipe 17, and the valve 19 is opened to equalize the pressure on the walls of the expander 12, the elasticity of whose walls withdraws the expander from the record to its normal size. The mold with the record therein is now allowed to cool (or an artificial cooling operation may be performed) whereby the record will contract diametrically so as to free itself from the matrix and be allowed to be removed by swinging the mold bottom downwardly. This separation of the finished duplicate from the matrix will be facilitated if the bore of the matrix is formed with a very slight taper, as is common in the art.

Although I have referred in the preceding description to the use of a vacuum, it will be understood that I use the expression in its topical sense and mean any such condition of rarefaction as can be commercially secured by a well designed exhausting or vacuum pump.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:—

1. A process of duplicating sound records which includes introducing within a hollow matrix a tubular blank of impressionable material, introducing within the blank a hollow flexible expander, exhausting the air from the matrix and from the expander and expanding the blank outwardly into engagement with the matrix, substantially as set forth.

2. A process of duplicating sound records which includes introducing within a hollow matrix a tubular blank of impressionable material, introducing within the blank an expander, exhausting the air from the matrix and at the same time preventing the expansion of the expander, and then expanding the blank outwardly into engagement with the matrix by means of the said expander, substantially as set forth.

3. A process of duplicating sound records which includes introducing within a hollow matrix a tubular blank of impressionable material, introducing within the blank a hollow flexible expander, exhausting the air from the matrix and from the expander and admitting air into the expander to expand the blank into engagement with the matrix, substantially as set forth.

4. A process of duplicating sound records which includes introducing within a hollow matrix a tubular blank of impressionable material, introducing within the blank a hollow flexible expander, exhausting the air

from the matrix and from the expander, and forcing the air under pressure into the expander to expand the blank into engagement with the matrix, substantially as set forth.

5 5. A process of duplicating sound records which includes introducing within a hollow matrix a tubular blank of material which may be softened by heat, introducing within the blank a hollow flexible expander, ex-
10 hausting the air from the matrix and from the expander, heating the matrix to soften the blank and expanding the blank outwardly into engagement with the matrix, substantially as set forth.

15 6. A process of duplicating sound records which includes introducing within a hollow matrix a tubular blank of material which may be softened by heat, introducing within the blank a hollow flexible expander, ex-
20 hausting the air from the matrix and from the expander, heating the matrix to soften the blank, expanding the blank outwardly

into engagement with the matrix, and cooling the matrix so as to set the impression, substantially as set forth.

25

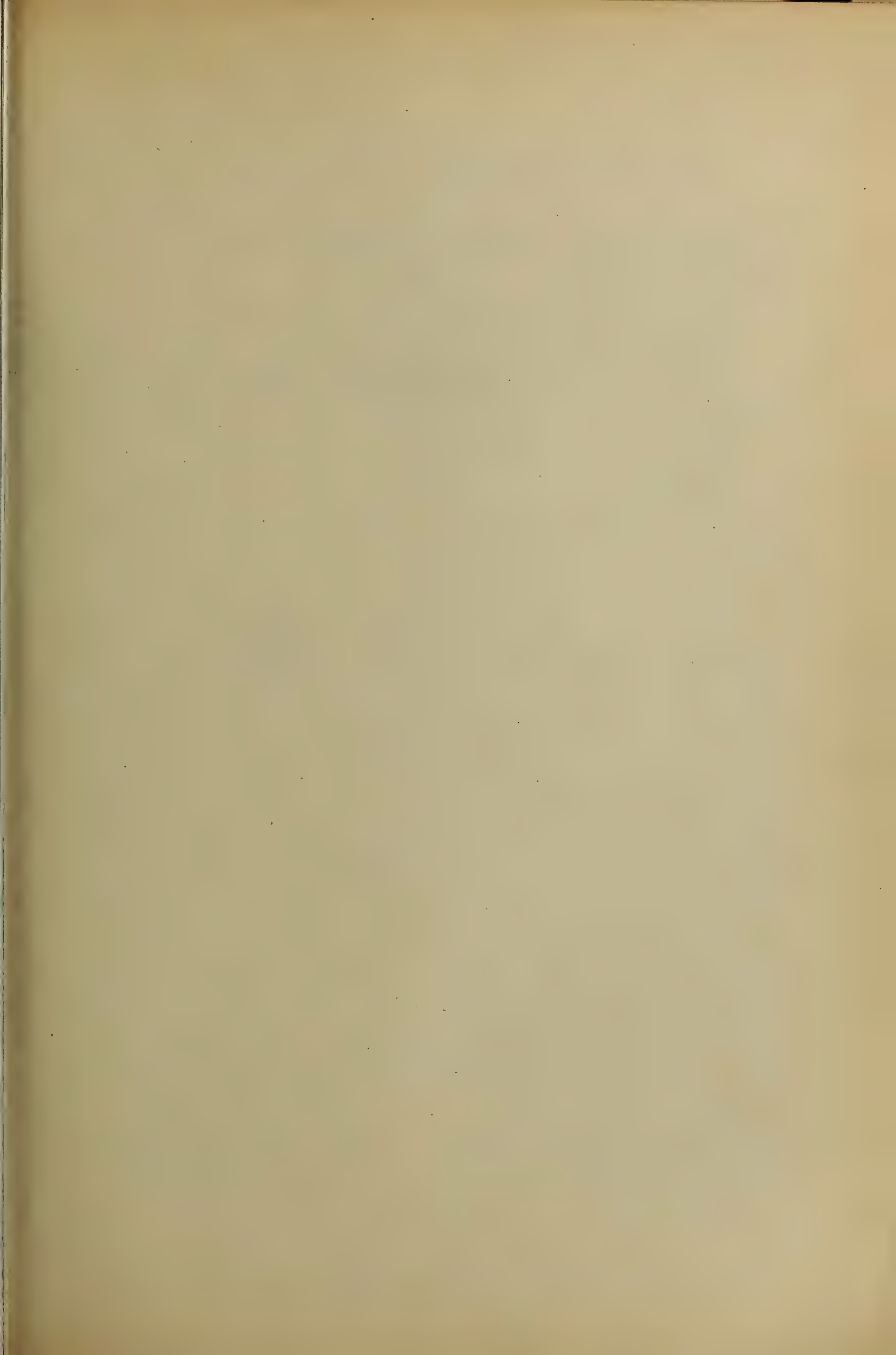
7. A process of duplicating sound records which includes introducing within a hollow matrix a tubular blank of material which may be softened by heat, introducing within the blank a hollow flexible expander, ex-
30 hausting the air from the matrix and from the expander, heating the matrix to soften the blank, expanding the blank outwardly into engagement with the matrix, cooling the matrix so as to set the impression, and finally
35 shrinking the resulting duplicate diametrically to permit its removal, substantially as set forth.

This specification signed and witnessed this 29th day of Novr. 1905.

JONAS W. AYLSWORTH.

Witnesses:

FRANK L. DYER,
ANNA R. KLEHM.

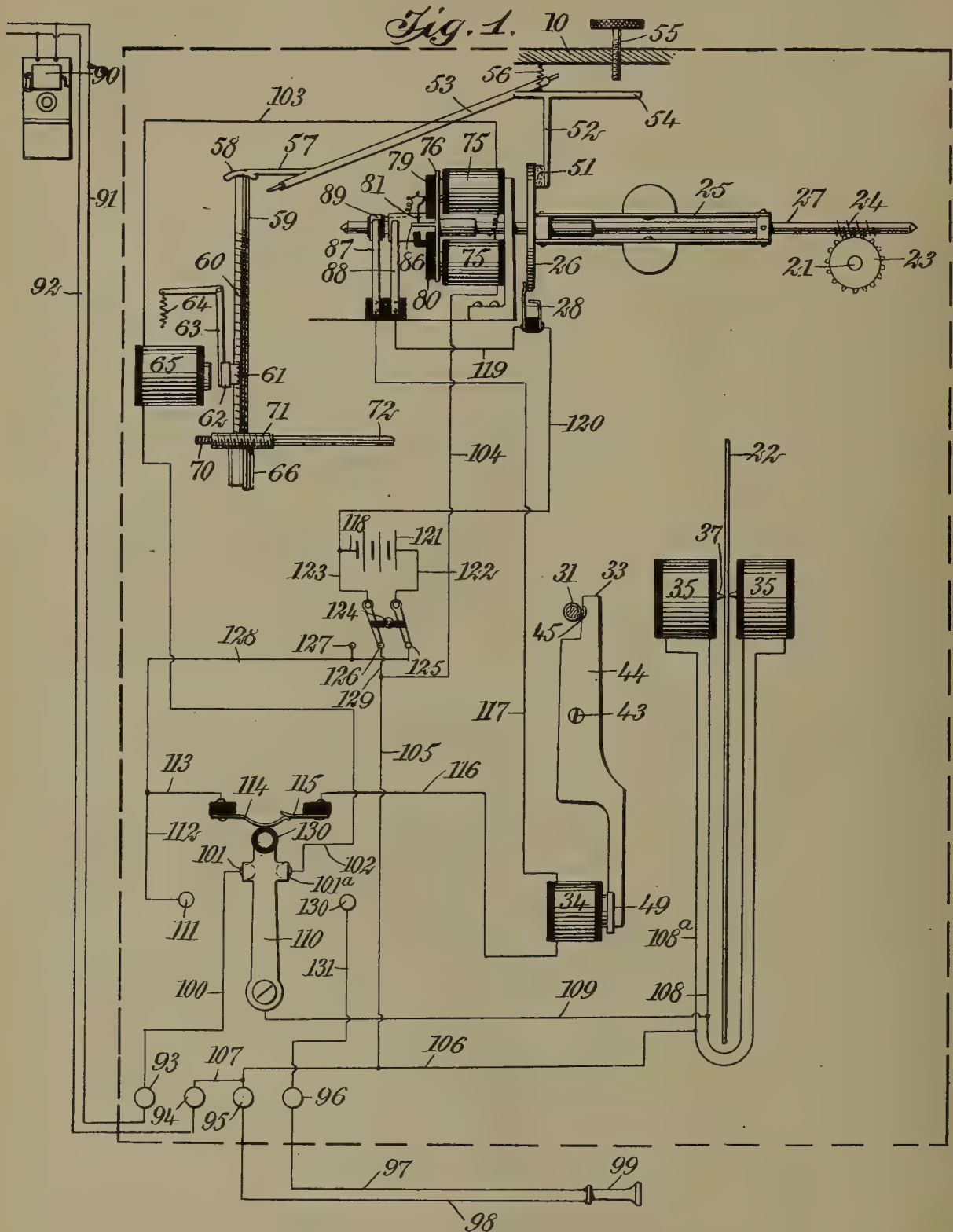


G. MORIN.

TELEPHONE SYSTEM.

APPLICATION FILED JAN. 30, 1907.

6 SHEETS—SHEET 1.



WITNESSES

L. G. H. H. H.
 Walton Harrison

INVENTOR

George Morin
 BY *Mum & Co*

ATTORNEYS

G. MORIN.
TELEPHONE SYSTEM.
APPLICATION FILED JAN. 30, 1907.

6 SHEETS—SHEET 2.

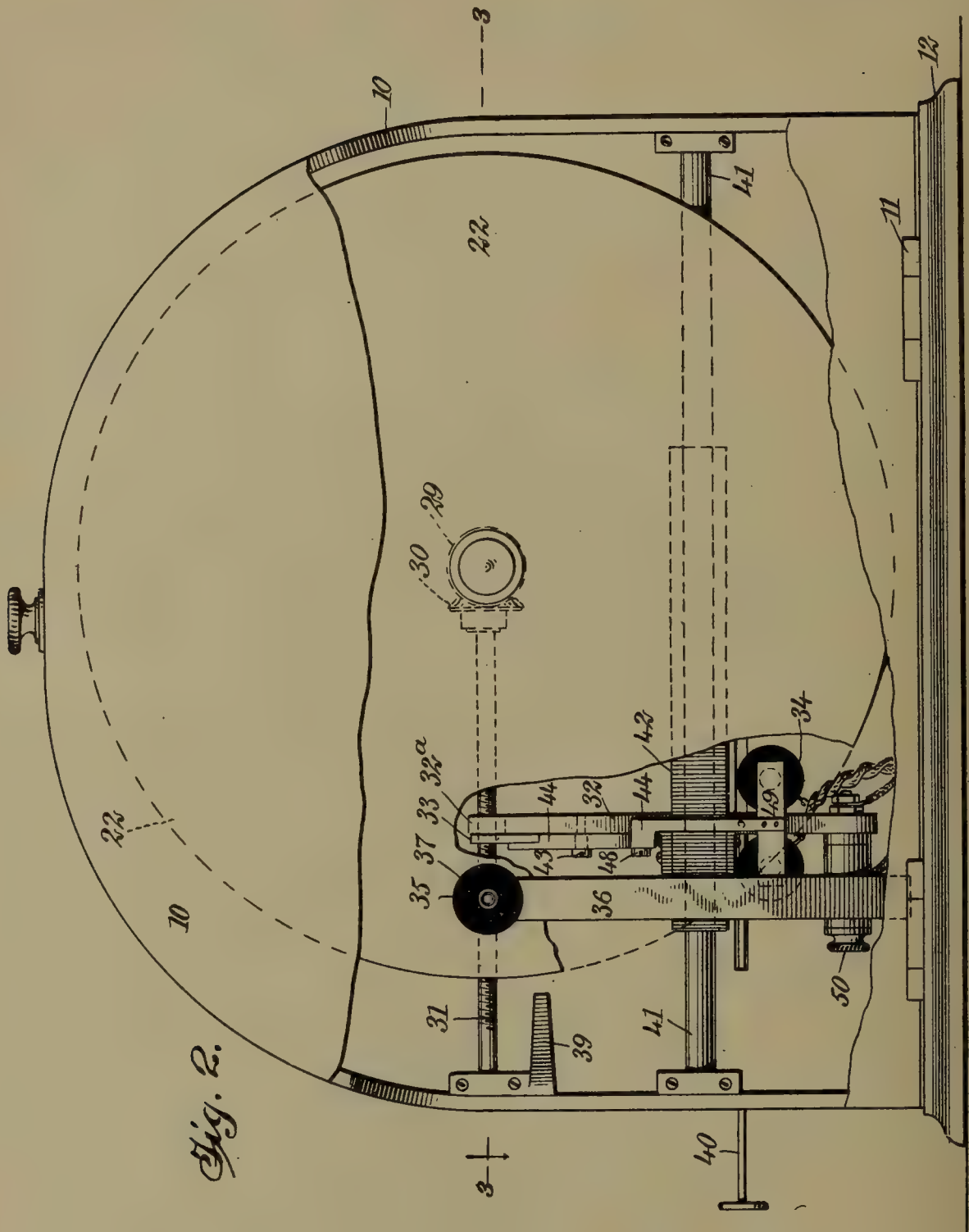


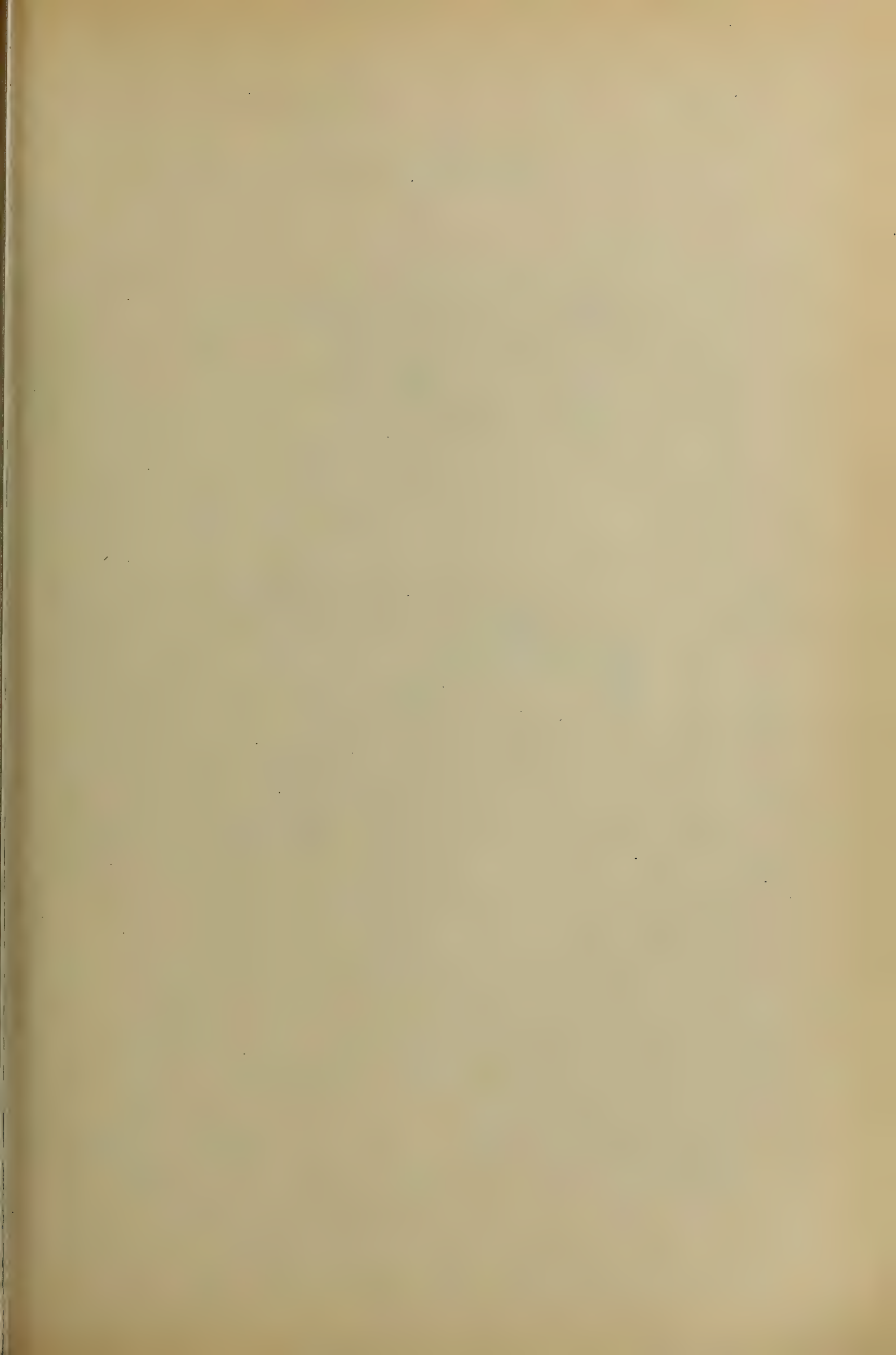
Fig. 2.

WITNESSES

L. Gifford Handy
Walton Harrison

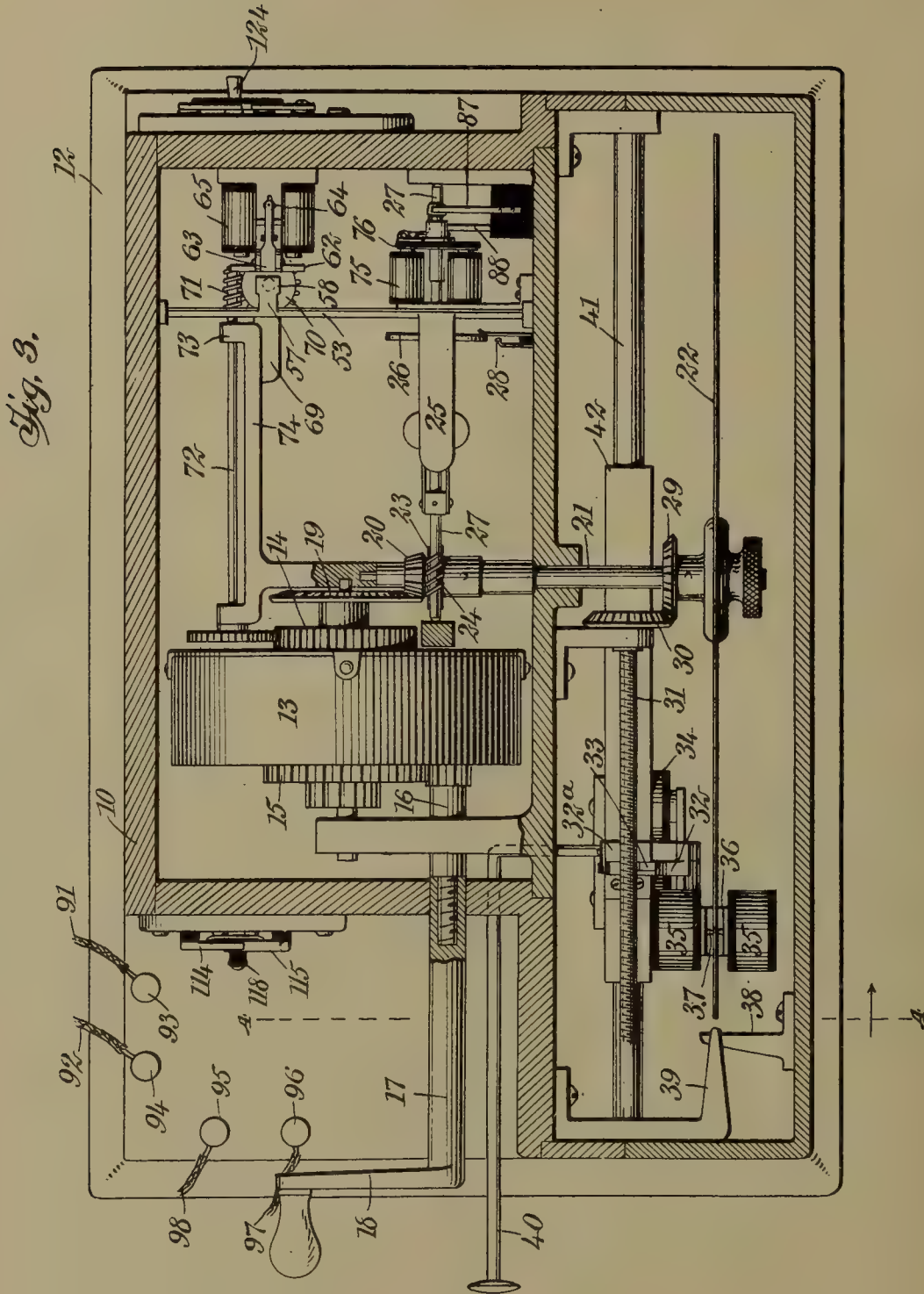
INVENTOR

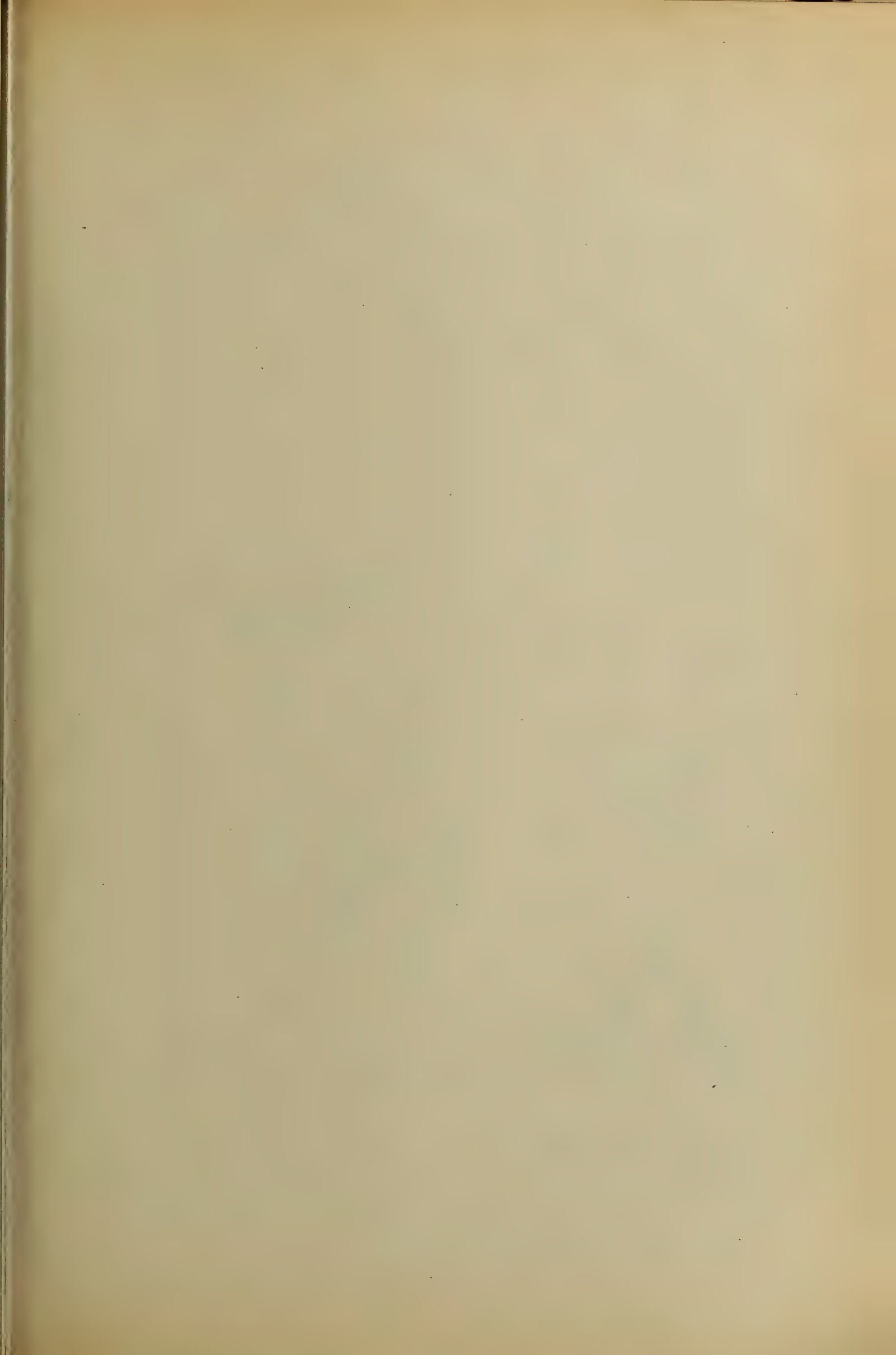
George Morin
BY *Mum Co*
ATTORNEYS



G. MORIN.
TELEGRAPHONE SYSTEM.
APPLICATION FILED JAN. 30, 1907.

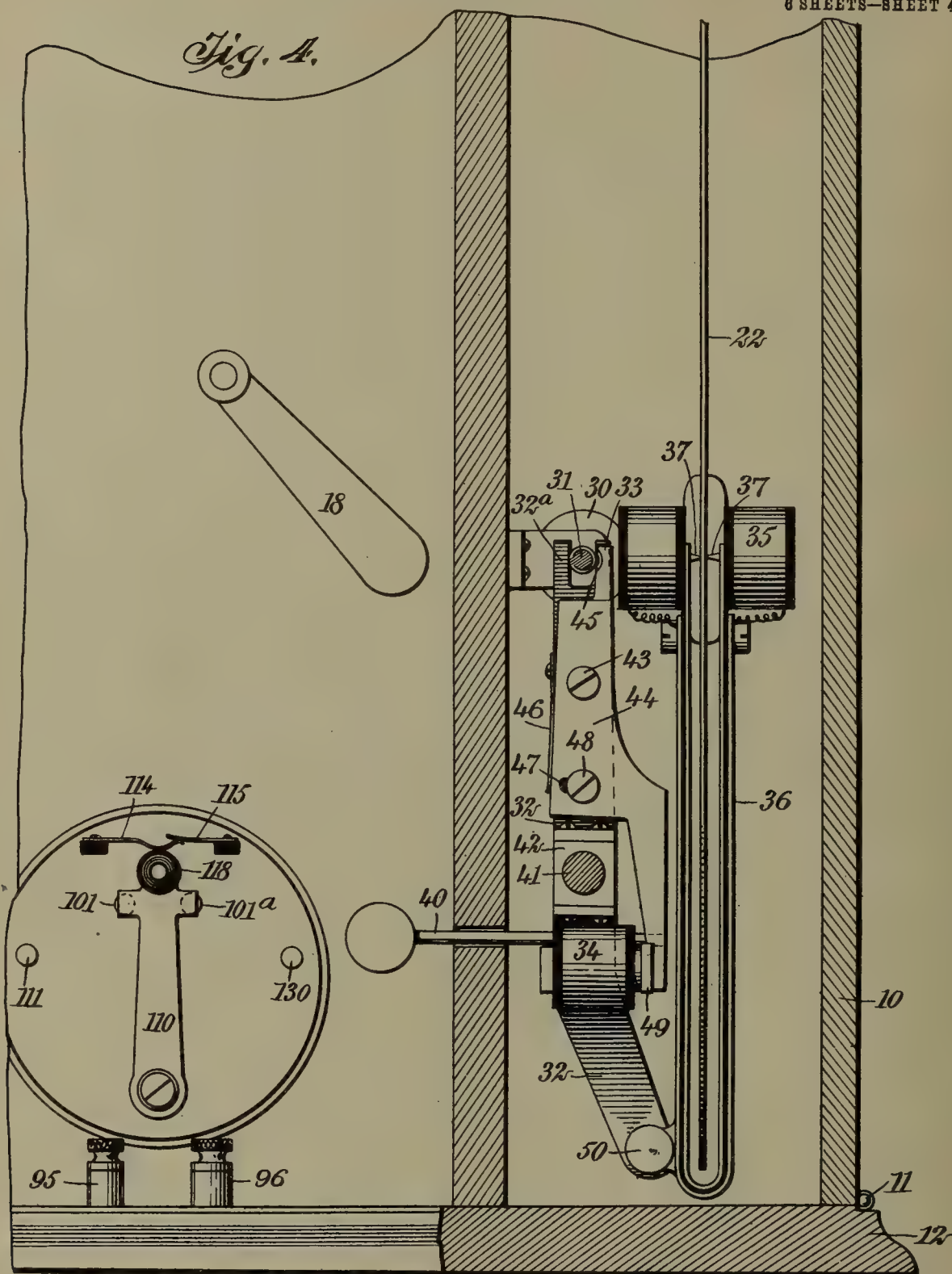
6 SHEETS—SHEET 3.





G. MORIN.
TELEGRAPHONE SYSTEM.
APPLICATION FILED JAN. 30, 1907.

6 SHEETS—SHEET 4.

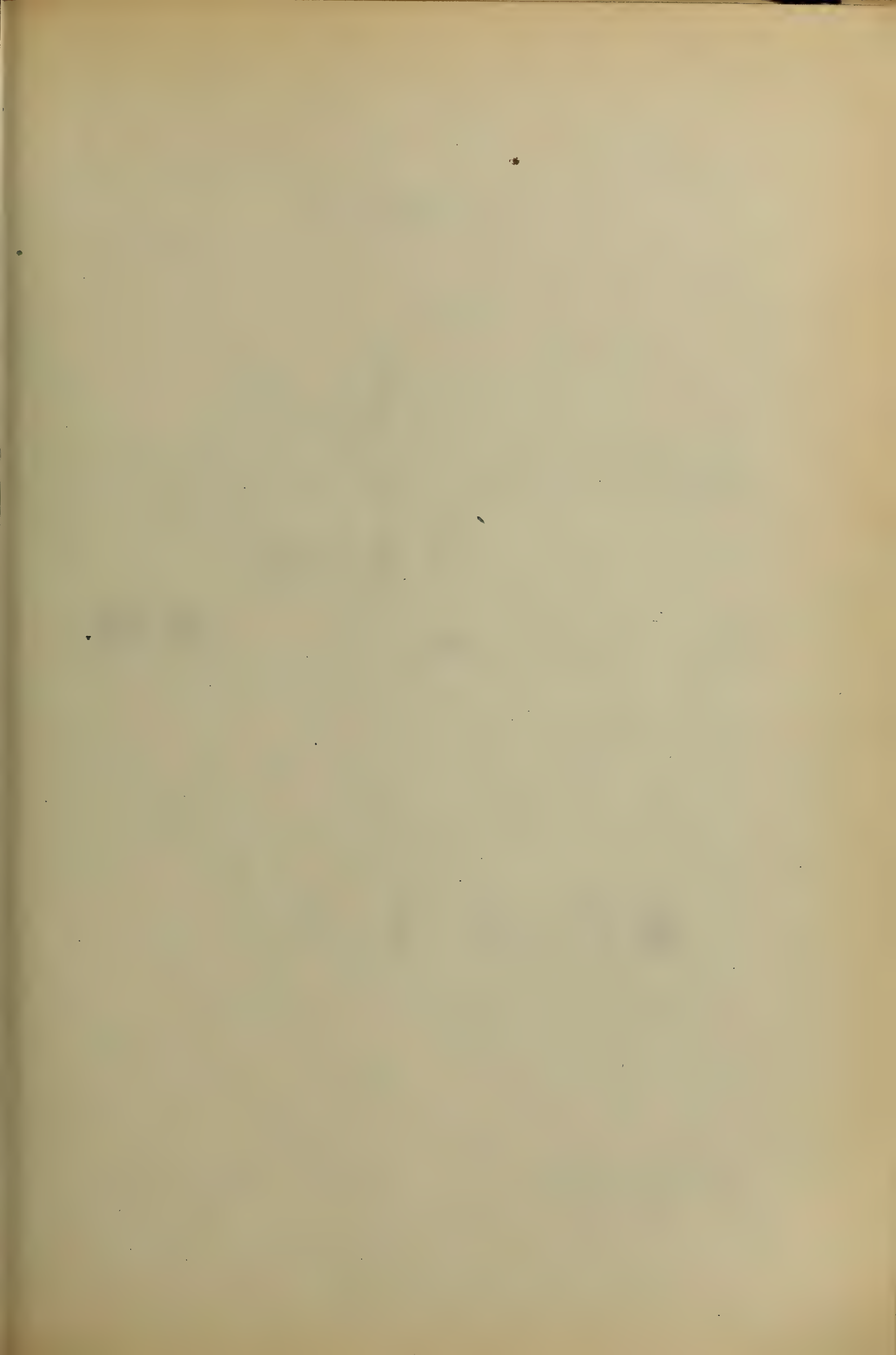


WITNESSES

Le Grand Handley
Walton Harrison.

INVENTOR

George Morin
BY *Mum & Co*
ATTORNEYS

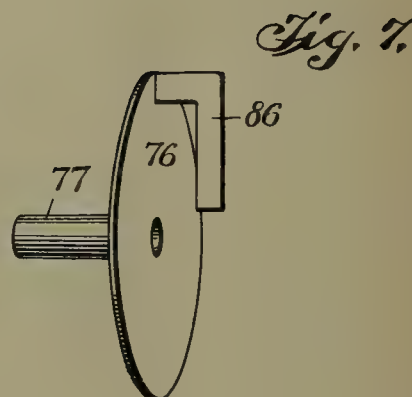
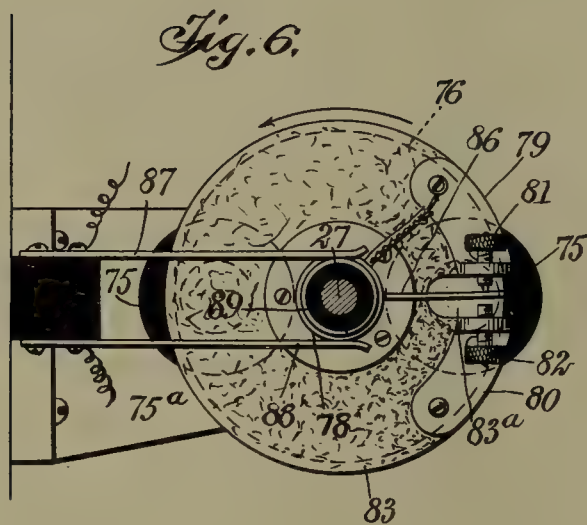
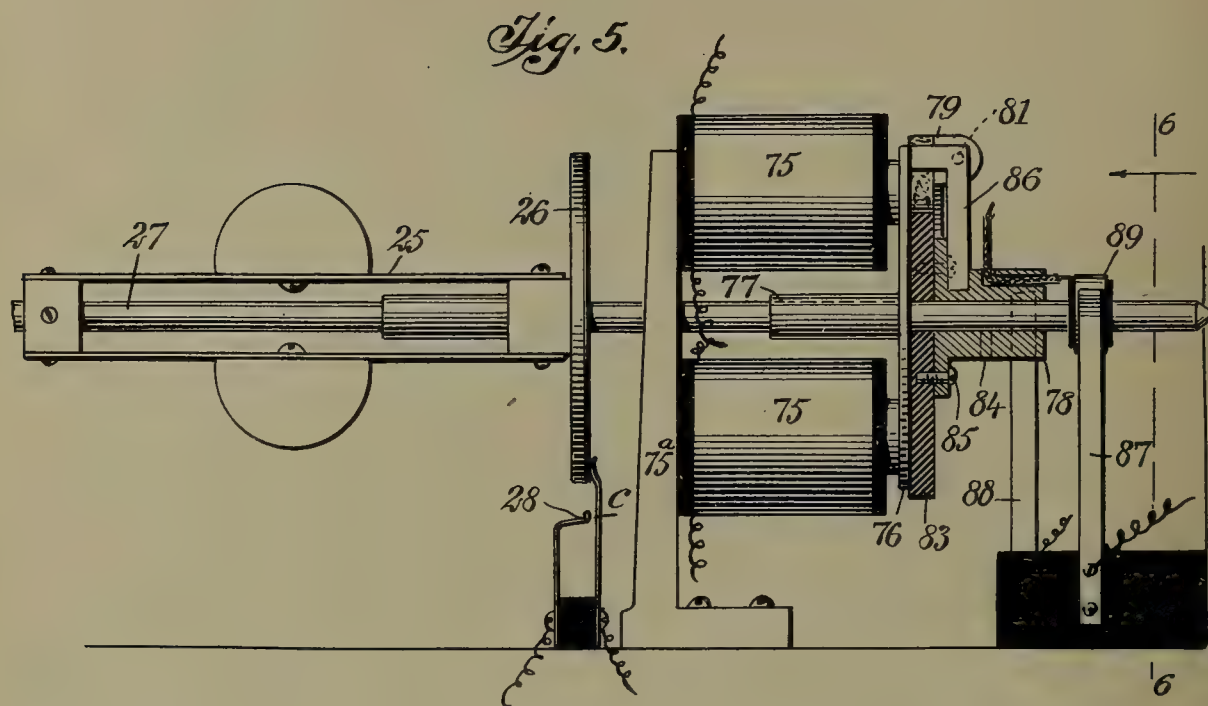


No. 871,726.

PATENTED NOV. 19, 1907.

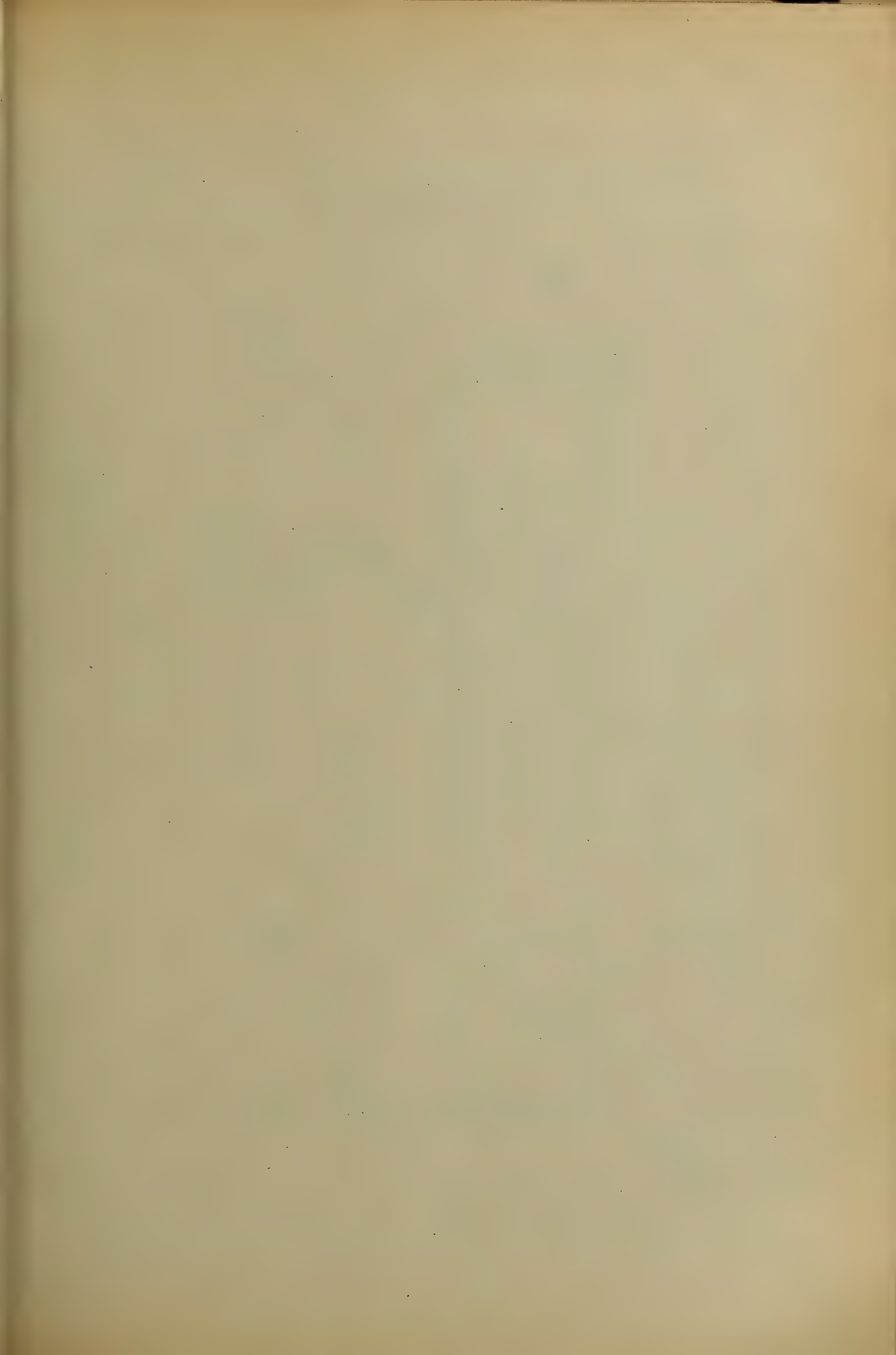
G. MORIN.
TELEGRAPHONE SYSTEM.
APPLICATION FILED JAN. 30, 1907.

6 SHEETS—SHEET 5.



WITNESSES
L. George Handley
Walton Harrison.

INVENTOR
George Morin
BY *Mum & Co*
ATTORNEYS



No. 871,726.

PATENTED NOV. 19, 1907.

G. MORIN.
TELEGRAPHONE SYSTEM.
APPLICATION FILED JAN. 30, 1907.

6 SHEETS—SHEET 6.

Fig. 8.

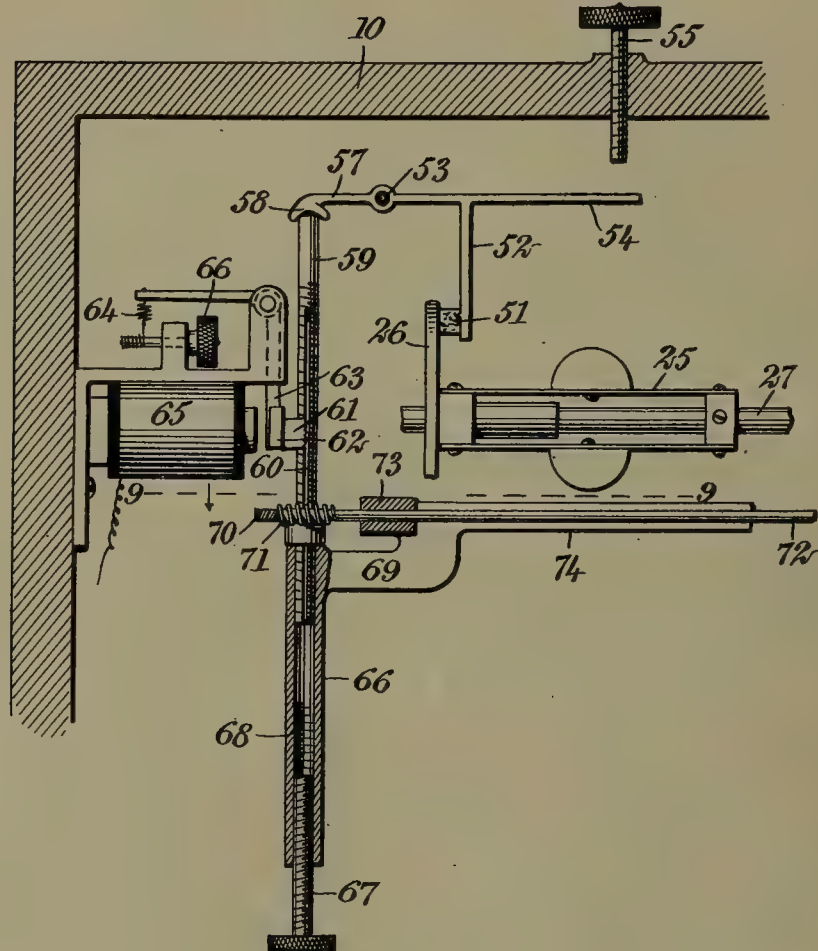
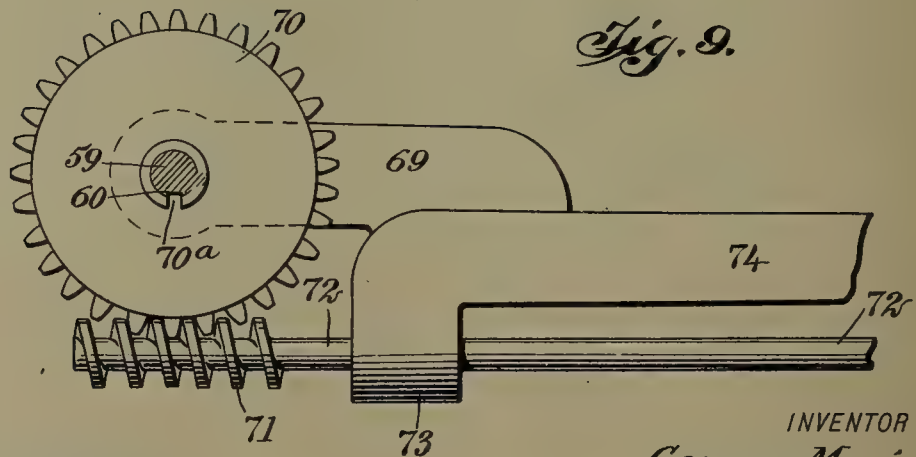


Fig. 9.



WITNESSES

L. G. Hand
Walton Harrison

INVENTOR

George Morin
BY *Mum & Co*

ATTORNEYS

UNITED STATES PATENT OFFICE.

GEORGE MORIN, OF HABANA, CUBA.

TELEGRAPHONE SYSTEM.

No. 871,726.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Application filed January 30, 1907. Serial No. 354,822.

To all whom it may concern:

Be it known that I, GEORGE MORIN, a citizen of the United States, and a resident of Habana, Cuba, have invented a new and
5 Improved Telegraphone System, of which the following is a full, clear, and exact description.

My invention relates to telegraphone systems, my more particular object being to so
10 connect the telegraphone with line wires as to enable the instrument to be easily controlled from a distance.

My invention further relates to provision for preventing undue waste of the available
15 record space upon the movable member bearing the record.

My invention further relates to means whereby a person may leave a telegraphone in such condition that during absence of the
20 person the telegraphone will automatically receive a message intended for the person and will, under proper conditions, reproduce this message carefully.

My invention further relates to certain details of construction whereby the general efficiency of the telegraphone and parts associated therewith are generally improved.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference
30 indicate corresponding parts in all the figures.

Figure 1 is a diagram showing the wiring of my system, a delicate relay connected
35 with this wiring and adapted to be actuated by the human voice for the purpose of controlling certain movable parts and thereby preventing undue waste of the sound record of the telegraphone, this view also showing
40 means operated electrically from a distance for starting the telegraphone into action and for stopping its action upon the expiration of a predetermined time limit; Fig. 2 is a side elevation showing a part of the telegraphone
45 mechanism and casing containing the same, certain parts being broken away. Fig. 3 is a horizontal section through the casing showing the telegraphone mechanism including a revoluble disk sound record, means
50 for controlling a traveling carriage, and traveling magnetic mechanism co-acting with this record; this view further shows the relay above mentioned, and also a part of the means for starting and stopping the telegraphone; Fig. 4 is an enlarged fragmentary

section upon the line 4—4 of Fig. 3, looking in the direction of the arrow and showing the record disk, the magnetic mechanism co-acting therewith for recording and reproducing sounds, and mechanism controllable
60 from a distance for stopping and starting the travel of this magnetic mechanism; Fig. 5 is a plan partly in section, showing the relay controllable by the human voice for governing the motion of the magnets 35 relatively
65 to the center of the disk 22; Fig. 6 is a vertical section upon the line 6—6 of Fig. 5, looking in the direction of the arrow and showing the contact forming a part of the relay 75, this contact being opened and closed by
70 sound-controlled agency from a distance; Fig. 7 is a perspective of the armature of the relay 75, this armature being controllable by so-called "magnetic drag"; Fig. 8 is an enlarged fragmentary elevation of the mechanism
75 operated electrically from a distance for stopping and starting the spring motor of the telegraphone, the casing 10 in this view being shown in section; and Fig. 9 is an enlarged fragmentary plan of the worm 71 and
80 worm gear 70 used for turning the screw 59 (see Fig. 8) incidental to stopping and starting the spring motor of the telegraphone.

A casing 10 is, by aid of hinges 11, mounted upon a base 12. Contained within the
85 casing 10 is a spring motor 13 including various gear wheels 14, 15, and a winding shaft 16, the latter being provided with an outwardly extending portion 17 and with a hand crank 18 whereby the spring motor may be
90 wound in the usual manner. The spring motor also includes a bevel gear 19 which meshes with a bevel pinion 20, the latter being rigid upon a revoluble shaft 21. A record disk is shown at 22 and is of the so-called
95 magnetic type. This disk is mounted firmly upon the shaft 21 and turns when the latter rotates. Mounted firmly upon the shaft 21 is a worm gear 23 which meshes with a worm 24. A governor is shown at 25 and is provided with a revoluble disk 26, the governor
100 and disk being actuated by a shaft 27 integral with the worm 24. A spring contact 28 is located just below the disk 26 and is opened and closed by movements of this
105 disk in the general direction of the axis of the governor shaft 27. When the shaft turns, the governor pulls the disk 26 to the left according to the view shown in Fig. 5 and this closes the contact 28. Hence, while the telegraphone 110

raphone is in action, the contact 28 is closed, whereas this contact is opened when the telegraphophone is idle.

Mounted rigidly upon the revoluble shaft 21 is a bevel gear 29 which meshes with a bevel gear 30 mounted rigidly upon a revoluble screw shaft 31. A bracket 32 is located below the screw shaft 31 and is provided with lugs 32^a disposed upon opposite sides of the screw shaft 31. Practically speaking, therefore, the bracket 32 has its upper end bifurcated so as to straddle the screw shaft. A hardened steel blade 33 (see Fig. 4) is disposed in immediate proximity to the screw shaft 31 and is adapted to engage and disengage the latter, for purposes hereinafter described.

Mounted upon the bracket 32 (see Fig. 4) is a horse shoe electro-magnet 34. The telegraphophone magnets are shown at 35 and are connected together by a U-shaped spring 36. The magnets 35 are provided centrally with pointed cores 37, the latter engaging the disk 22 so as to confer thereupon or to receive therefrom magnetic impulses corresponding to sound vibrations. A limiting stop 38 (see Fig. 3) prevents excessive travel of the U-shaped spring 36 in one direction. A stationary bracket 39, having substantially the form of a wedge, is employed for the purpose of spreading the U-shaped spring 36 whenever necessary, in order to adjust the tension or position of the pointed cores 37 relatively to the disk 22. For this purpose a handle 40 (see Fig. 3) is provided; the operator merely pulls the handle outwardly so as to force the U-shaped spring member 36 astride of the wedge 39 and thus distend the U-shaped member to any desired extent, the distension being continued until the U-shaped member lodges against the limiting stop 38. A comparatively stiff rod 41 extends lengthwise of the casing. Mounted upon this rod 41 is a tubular slide 42 connected rigidly with the bracket 32 (see Figs. 2 and 4). Mounted upon a screw pivot 43 is a rocker 44 to which the blade 33, above described, is rigidly secured. This blade is provided with a concave edge 45 which is, in effect, a fragmentary threaded nut adapted to engage and disengage the screw shaft 31, so as to force the blade 33 and all parts connected with it, in a general direction parallel with that of the screw shaft.

A leaf spring 46 is mounted upon the bracket 32 and engages the edge of the rocker 44. This rocker is provided with a slot 47 through which passes a screw 48 engaging the bracket 32. This allows the rocker 44 to turn or rock slightly upon the pivot 43 as a center. In doing this the rocker brings the edge or thread 45 into and out of engagement with the screw shaft 31, as above described. Mounted rigidly upon

the lower end of the rocker 44 is an armature 49 adapted to be attracted and released by the magnet 34. The lower end of the bracket 32 is connected by a pivot 50 with the U-shaped member 36. This allows the U-shaped member a little freedom and widens its adaptability to conform to accidental variations in the shape of the disk 22, due, for instance, to unavoidable distortion or buckling of the latter. It also allows ease of movement of the bracket 32 and tubular slide 42 relatively to the rod 41.

It will readily be seen that whenever the magnet 34 is energized, the screw shaft 31 being in motion, the bracket 32 and all parts connected therewith, including the magnets 35, must begin to travel toward the center of the disk and that this travel must cease when the magnet 34 is deenergized (see Fig. 4). It will also be seen that the disk may rotate continuously although the travel of the magnets 35 may be intermittent.

The disk 26, carried by the governor (see Fig. 1), in addition to opening and closing the contact 28, serves as a brake disk for stopping and starting the action of the spring motor. To this end a brake shoe 51 is mounted upon a brake rod 52, the latter being rigidly connected with a rocker shaft 53 and provided with a rigid portion 54 extending beneath an adjusting screw 55. By turning the screw 55, the play of the brake rod 52 and brake shoe 51 may be controlled within different limits. A spring 56 tends to retract the brake rod 52 and to remove the brake shoe 51 from engagement with the disk 26 whenever the shaft 53 is rocked in the proper direction for so doing.

Mounted upon the rocker shaft 53 is another brake rod 57 provided with a concave brake shoe 58. Disposed below this brake shoe 58 and adapted to engage the same, is a screw shaft 59 provided with a slot 60 extending throughout a good portion of its length. A threaded shoe 61, constituting in effect a fragmentary nut, is adapted to engage and disengage the screw shaft 59. The shoe 61, together with an armature 62 is mounted upon a bell crank lever 63, the latter being movable and provided with a retracting spring 64. A magnet 65 is disposed adjacent to the armature 62, and, when energized, draws the same. It will be seen that when the magnet 65 is energized, the threaded shoe 61 is removed from the screw shaft 59, and that when the magnet 65 is deenergized, the retracting spring 64 instantly throws the threaded shoe 61 into engagement with the screw shaft 59.

A tube 66 (see Fig. 8) is fitted with an adjusting screw 67, and for this purpose is provided internally with threads 68. This tube is mounted upon a bracket 69. A worm gear 70 meshes with a worm 71, the latter being integral with a revoluble shaft 72.

This shaft rotates within a bearing 73 forming a part of a bracket 74 (see Fig. 9). The upper end of the tube 66 is smooth and the screw shaft 59, while threaded and extending into this tube, does not engage it as a nut would engage a screw, but simply incloses it loosely. By this means the screw shaft 59 has merely a sliding relation to the tube 66, and may be abruptly raised or lowered with reference to the same. The inner diameter of the tube 66 at the point represented by the thread 68 is sufficiently large to enable the screw shaft 59 to be abruptly raised or lowered, independently of any rotative movement of the screw shaft.

When the motor 13 is in action, the shaft 72 and worm 71 rotate and cause the worm gear 70 to return. This gear is provided with a spline 70^a (see Fig. 9) which fits into the slot 60. The relation of the gear 70 to the screw shaft 59 is, owing to the action of the spline, a little peculiar. When the gear 70 turns, the spline 70^a causes the screw shaft 59 to turn at the same rate of speed as the gear 70, but at the same time leaves the screw shaft 59 free to ascend, descend, or to remain at a given altitude, as the case may be. If, now, the threaded shoe 61 happens to be in engagement with the screw shaft 59, the rotation of the latter, of course, causes it to climb or to rise relatively to the shoe 61, and if at any time the threaded shoe 61 be withdrawn by action of the magnet 65 upon the armature 62 (see Fig. 7) the screw shaft 59 drops abruptly downward until stopped by the adjusting screw 67. Hence, all that the gear 70 does is to turn the screw shaft 59 independently of the altitude thereof, and all that the magnet 65 does, acting through the threaded shoe 61, is to cause the screw shaft 59 to rise gradually or to fall abruptly as the case may be. If, now, the magnet 65 be deenergized so that the threaded shoe 61 rests in engagement with the screw shaft 59, for a predetermined length of time, say five minutes, the screw shaft 59 rises until it reaches the brake shoe 58 (see Fig. 8). It thereupon causes the rocker shaft 53 to turn, and this movement brings the brake shoe 51 against the friction disk 26, thereby stopping the motor. By moving the adjusting screws 55, 67, the precise duration of the movement, before the motor is stopped, may be varied within certain limits.

In Fig. 5 is shown the "magnetic drag" relay, controllable electrically from a distance for the purpose of energizing and deenergizing the circuit through the magnet 34, and by doing this, to exert control over movements of the telegraphophone magnets 35. The relay magnet is shown at 75 and is mounted upon a bracket 75^a. A revoluble disk 76 is made of magnetic material and constitutes the armature for the magnet 75.

This disk is provided with a sleeve 77 integral therewith and encircling the governor shaft 27. A hub 78 also encircles the governor shaft but is immovable relatively thereto. A pair of lugs 79, 80, of the shaft, indicated in Fig. 6, are provided. Revolvably mounted upon the lug 79 is an adjusting contact screw 81. Another screw 82 is mounted upon and movable in relation to the lug 80. These lugs 79, 80 are secured rigidly upon a disk 83 of insulating material, this disk being provided with a radially disposed slot 83^a, as will be understood from Fig. 6.

A set screw 84 permits removal of the hub 78 and yet maintains the hub rigidly in position when in use. A spring tongue 86, preferably of platinum, is mounted rigidly upon the revoluble disk 76 and engages the hub 78, as will be understood from Fig. 5. The arrangement of these parts is such that the rotation of the disk 76 may be retarded slightly and the governor shaft 27 and hub 78 may turn ahead a slight fraction of a revolution, the shaft 27 being loose as compared with the disk 76. In other words, the revolution of the contact spring 86 constitutes an elastic connection from the disk 76 to the shaft 27 and parts connected therewith, so that the relation of the shaft 27 and disk 76 is only approximate as to relative position. Now, as indicated in Fig. 6, the spring tongue 86 normally engages the contact screw 81. If, however, there be a slight motion of the disk 76, the contact screw 81 moves away from the contact spring 86, and thus breaks connection with the screw. When, therefore, the magnet 75 is energized, contact is broken and when the magnet is deenergized, the contact is closed, this being just the reverse of the action of the ordinary telegraphic relay.

By means of screws 85 the disk 83, of insulating material, is at all times maintained rigid in relation to the hub 78. In fact, all parts immediately connected with the shaft 27 rotate therewith and are rigid in relation thereto, aside from the flexibility of the coupling between the disk 76 and the shaft, as above described.

Brushes 87, 88 are disposed adjacent to each other, the brush 88 being in electrical communication with the hub 78 and contact spring 86, the brush 87 engaging a slip ring 89, as will be understood from Fig. 5. The brushes 87, 88 are the terminals of the local circuit of the relay, the main circuit thereof being through the magnet 75. The action of the relay is quite simple. The magnet 75 being energized, the disk 76 is drawn toward it and its rotation slightly retarded by its friction against the magnet cores. The shaft 27, continuing its rotation in the direction indicated by the arrow in Fig. 6, causes the contact screw 81 to break

engagement with the contact spring 86. This leaves open the local circuit; that is, the circuit through brushes 87, 88.

Referring again to Fig. 1, a telephone may be seen at 90 which is preferably of considerable power. From this telephone line wires 91, 92 lead to binding posts 93, 94. Adjacent to these binding posts are others 95, 96, and connected with the two latter are wires 97, 98 and a telephonic receiver 99. From the binding post 93 a wire 100 leads to a contact button 101. Another contact wire 101^a is connected by a wire 102 with the magnet 65. From the latter a wire 103 leads to the relay magnet 75 and from this magnet wires 104, 105, 106, 107 lead down to binding posts 94, 95. Wires 108, 108^a are connected with the telephone magnets 35. A wire 109 connects the wire 108 with a switch blade 110. A contact button 111 is disposed in the path of this switch blade. From the contact button 111 a wire 112 leads upwardly and connects with a wire 113. The latter leads to a contact spring 114 adapted to engage and disengage another contact spring 115; this last contact spring 115 is connected by a wire 116 with the magnet 34 used as above described, for controlling the travel of the telegraphophone magnets 35. From the magnet 34 a wire 117 leads upwardly to the brush 87. The other brush 88 is connected by a wire 119 with the contact 28. From the latter wires 120, 118 lead to a local battery 121. This battery is connected by wires 122, 123 with a pole changer 124; this pole changer has contact buttons 125, 126, 127. The contact buttons 125, 127 are connected with a wire 128, the latter being in turn connected with wires 112, 113. The contact button 126 is connected by a wire 129 with wires 105, 125. The switch blade 110 is provided with an insulated boss 110^a for forcing the contact spring 114 against the contact spring 115, as will be understood from the lower left hand corner of Fig. 1.

The action of my system is as follows: We will suppose that the mechanism shown in Fig. 1, with the exception of the telephone 90 and line wires 91, 92, represents the outfit of a subscriber, and that the latter wishes to absent himself and have the system take down any message which may be sent during his absence. He moves the switch blade 110 into the position indicated, thereby causing it to close contact between springs 114, 115. The spring motor we will suppose is properly wound up and it makes no difference whether it be left running or idle. If it be left running the rotation of the screw shaft 59 raises the latter until it engages the brake shoe 85, thus causing the rocker shaft 53 to turn and bring the shoe 51 against the disk 26, thereby preventing further rotation of the motor. This occurs in a few minutes, if

the switch blade 110 is placed in the position indicated in Fig. 1 and the apparatus *in statu quo* until the call is made. Suppose now that a subscriber at the telephone 90 wishes to make a communication. To all intents and purposes he "rings" in the usual manner. In other words, he sends an alternating magneto current over a line as if he were ringing. The following circuit is thereby completed: magneto of telephone 90, line wire 91, binding post 93, wire 100, contact button 101, switch blade 110, contact button 101^a, wire 102, magnet 65 (I call this for convenience the starting magnet) wire 103, relay magnet 75, wires 104, 105, 106, 107, binding post 94, line wire 92, back to generator of telephone 90. This energizes the starting magnet 65 and causes it to attract its armature 62. The screw shaft 59, being now unsupported, drops down upon the screw 67 (see Figs. 1 and 8). The pressure against the brake shoe 58 being now relieved, the retracting spring 56 causes the withdrawal of the brake shoe 51 from the disk 26. The spring motor mechanism now starts, having been previously wound, as above explained. When the motor mechanism starts, the governor 25 is thrown into action. This causes the disk 26 to move laterally to the right, according to the view shown in Fig. 1, and closes the contact 28. The telegraphophone is now in full action, except with reference to movements of the telegraphophone magnets 35 and parts carrying the same. Whether or not these magnets 35 and parts carrying the same are in motion must depend upon the position of the rocker 44 (see Fig. 1) and this must in turn depend upon whether the circuit through the magnet 34 is or is not completed, the completion of this circuit being ultimately controlled by the electrical condition of the relay magnet 75, as above explained. The calling subscriber now begins to talk and in so doing he sends talking currents over the following circuit: telephone 90, line wire 91, binding post 93, wire 100, contact button 101, switch blade 110, contact button 101^a, wire 102, magnet 65, wire 103, relay magnet 75, wires 104, 105, 106, 107, binding post 94, line wire 92, back to telephone 90. This circuit is identical with the one above traced, with the exception that at the telephone 90, it is the talking circuit instead of the ringing circuit. The talking circuit, however, being weaker, as usual, than the ringing circuit, is unable to have much effect upon the magnet 65 and consequently is unable to cause this magnet to withdraw the shoe 61 from engagement with the screw shaft 59. The relay magnet 75 being more sensitive, however, is energized by the talking currents and the disk 76 is attracted.

Owing to the "magnetic drag", above described, the disk is retarded and as the shaft 27 rotates under propulsion from the

spring motor, the contact is broken between the contact spring 86 and the contact screw 81. This opens the local circuit which is as follows: Battery 121, wire 122, right-hand member of the pole changer 124, contact button 125, wire 128, wire 113, contact springs 114, 115, wire 116, magnet 34, wire 117, brush 87, slip ring 89, lug 79, contact screw 81, contact spring 86, hub 78, brush 88, wire 119, contact 28 (now closed), wire 120, wire 118, back to battery 121. The battery circuit being thus opened, it follows that the magnet 34 must release its armature 49. This causes the rocker 44 to move under impulse from the leaf spring 46 (see Fig. 4) and therefore throws the fragmentary nut 45 into engagement with the screw shaft 31. The bracket 32, tubular slide 42, and telephone magnets 35 now begin to move toward the center of the record disk. If the talking subscriber continues his conversation quite steadily, there is no interruption of the motion of the telegraphophone magnets 35. Slight pauses between the words and at the ends of sentences are not sufficient to interfere with the action in the slightest degree, for the reason that the magnet 34 can not be deenergized until the circuit is opened between the contact spring 86 and the contact screw 81 (see Fig. 6) and this can not occur unless the voice-controlled currents through the line are stopped for a little period of time, sufficient to represent the length of time during which the shaft 27 can travel without causing the electrical connection to break. In any considerable pause in conversation, however, the electrical connection is broken for the reason that the contact screw 81 moves away from the contact spring 86. When this occurs, the local circuit, above traced, is again completed, the rocker 44 assumes the position indicated in Fig. 1, and the magnets 35 are enabled to travel. As soon, however, as the talking subscriber resumes his conversation, the magnet 34 is deenergized and the magnets 35 continue their travel. In this way the available surface of the record disk is saved, there being no waste due to extensive skips made by the telegraphophone magnets upon the disk. The apparatus is thus adapted for measured service.

When the record disk is completed, a larger volume of conversation is recorded than would be recorded under conditions where the telegraphophone magnets would continue to travel during intervals while the sounds were not being produced. During all the time while the record is being made the screw shaft 59 continues to rise, as above described until it lodges against the brake shoe 58, and this action, as above described, turns the rocker shaft 53 and applies the brake shoe 51, so as to stop the action of the

spring motor. This feature may, if desired, be employed in connection with measured service, the idea being that, when a call is made, the telegraphophone will be thrown into action and its action will continue for a predetermined period, say five minutes. Suppose now that the absent subscriber returns and wishes to ascertain what message, if any, has come while he was away. He turns the switch blade 110 (see Fig. 1) to the right and into engagement with the contact button 130. This breaks communication between contact springs 114 and 115, thus opening the circuit through magnet 34. Before doing this, however, he adjusts the magnets 35 in the usual manner so as to enable the telegraphophone to act as a reproducer. The switch blade 110 now resting upon the contact button 130, the following circuit is completed: Switch blade 110, contact button 130, wire 131, binding post 96, wire 97, receiver 99, wire 98, binding post 95, wire 106, wire 108^a, telegraphophone magnets 35, wire 108, wire 109, back to switch blade 110. This circuit is energized by the magnetic action of the disk upon the magnets 35, and, of course, the operator is enabled to read from the receiver 99 the reproduction of the sounds representing the message recorded. If, as is usually the case, the subscriber now wishes to erase the magnetic record from the record disk 22, he simply turns the switch blade 110 to the left, causing it to engage contact button 111. This movement breaks connection between the contact springs 114, 115, and completes the following circuit: Battery 121, wire 122, right-hand member of pole changer 124, contact button 125, wire 128, wire 112, contact button 111, switch blade 110, wire 109, wire 108, telegraphophone magnets 35, wire 108^a, wire 106, wire 105, wire 129, left-hand member of pole changer 124, and wires 123 and 118, back to battery 121. This energizes the magnets 35, and by causing them to act powerfully upon the record disk 22, the magnetic impressions upon this disk for representing sound vibrations are effectively erased. During this operation the disk 22 rotates and the magnets 35 travel in the same manner as if the machine were reproducing or recording.

I find it sometimes expedient to reverse the polarity of the battery 121 for purposes of removing magnetic impressions from the disk 22. In order to do this, I simply shift the pole changer 124 to the left, meanwhile turning the switch blade 110, thus completing the following circuit: Battery 121, wire 112, right-hand member of pole changer 124, wire 129, wire 105, wire 106, wire 108^a, magnets 35, wires 108, 109, switch blade 110, contact button 111, wires 112, 128, left-hand member of pole changer 124, wire 123, wire 118, back to battery 121.

Having thus described my invention, I

claim as new and desire to secure by Letters Patent:

1. In a system of the character described, the combination of a movable recording member, means for actuating the same, magnets movable in relation to the general position occupied by said recording member for the purpose of impressing a record thereupon, and sound wave controlled mechanism for stopping and starting said last-mentioned mechanism independently of movements of said movable recording member.

2. In a system of the character described, the combination of a movable record-receiving member, mechanism for impressing a record thereupon, motor mechanism for propelling said recording member, and electrically operated mechanism controllable at will by sounds at a distance for stopping and starting, relatively to said recording member, said means for impressing said record thereupon.

3. In a system of the character described, the combination of a relay, sound wave controlled mechanism connected with said relay for actuating the same, and means connected with said relay and controllable thereby for forming a record surface.

4. In a system of the character described, the combination of a telegraphone provided with a record member, means for impressing upon said record member a sound record, feed mechanism connected with said means for carrying the position thereof relatively to said record member, and sound wave controlled mechanism connected with said feed mechanism for stopping and starting the latter.

5. In a system of the character described, the combination of a telegraphone, means for actuating the same, and mechanism controllable from a distance by sound waves for throwing said telegraphone into and out of action at will.

6. In a system of the character described, the combination of a telegraphone, a motor for actuating the same, a brake for stopping said telegraphone, sound wave controlled mechanism for releasing said brake so as to allow said motor to start, and time-controlled mechanism connected with said motor mechanism for stopping said telegraphone after a predetermined measured service.

7. In a system of the character described, the combination of a telegraphone provided with a record member, means for actuating said record member, magnetic mechanism for impressing upon said record member impressions analogous to sound waves, means controllable electrically from a distance by sound waves for governing the position of said magnetic mechanism relatively to said

record member, and a telephone connected with said magnetic member for reproducing sounds.

8. In a system of the character described, the combination of a telegraphone provided with feed mechanism, a magnet for stopping and starting said feed mechanism, a relay having a local circuit connected with said magnet for energizing the latter, and sound wave controlled mechanism connected with said relay for energizing the latter.

9. In a system of the character described, the combination of a telegraphone provided with a revoluble member and with feed mechanism, a magnet for controlling said feed mechanism independently of said revoluble member, a relay provided with a local circuit connected with said magnet, said relay being further provided with a main circuit, and electric mechanism, controllable by sound waves, for energizing said relay.

10. In a system of the character described, the combination of a telegraphone, means for actuating the same from a distance, and sound wave controlled mechanism connected with said last-mentioned means for automatically stopping said telegraphone after a predetermined measured service.

11. In a system of the character described, the combination of a telegraphone, sound wave controlled mechanism for throwing said telegraphone into action, mechanism controllable by movements of said telegraphone for stopping the latter after a predetermined measured service, and adjusting mechanism controllable at will for governing said interval.

12. In a system of the character described, the combination of a feed screw, a bracket movable in relation thereto, magnets mounted upon said bracket, a rocker mounted upon said bracket and provided with a surface for engaging said feed screw, sound wave controlled mechanism operated electrically from a distance for actuating said rocker, and a record member movable in relation to said feed mechanism.

13. In a system of the character described, the combination of a feed screw, a bracket movable in relation thereto, magnets mounted upon said bracket, a rocker mounted upon said bracket and provided with a surface for engaging said feed screw, means for actuating said rocker, and a record member movable in relation to said feed mechanism.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE MORIN.

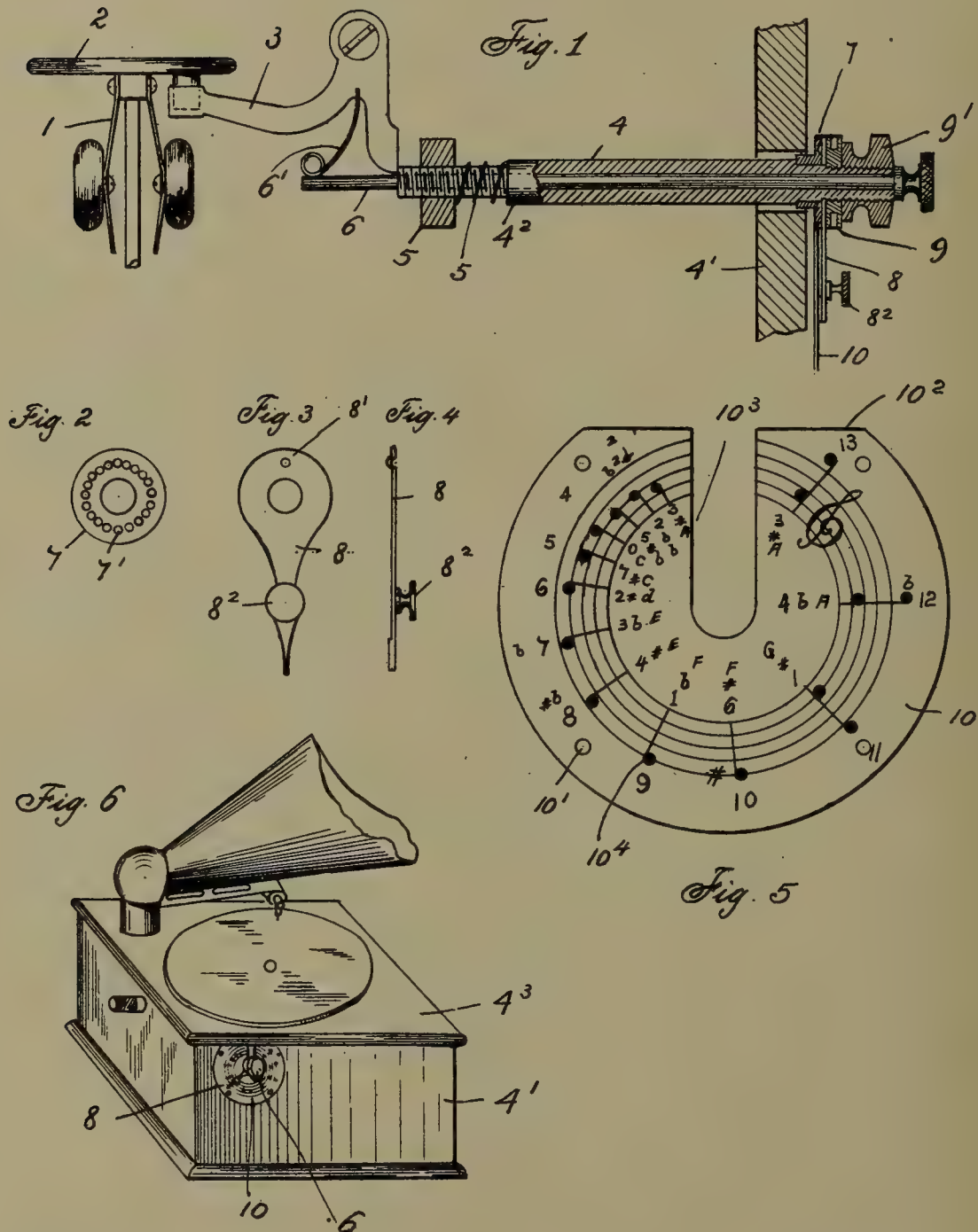
Witnesses:

VICTOR NORMAND,
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T. ZOEHL.

PITCH INDICATING DEVICE FOR GRAPHOPHONES AND THE LIKE.

APPLICATION FILED MAR. 18, 1907.



WITNESSES

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James O'Connor

INVENTOR

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by Robt. Klotz
Atty.

UNITED STATES PATENT OFFICE.

THEODOR ZOEBL, OF CHICAGO, ILLINOIS.

PITCH-INDICATING DEVICE FOR GRAPHOPHONES AND THE LIKE.

No. 872,399.

Specification of Letters Patent.

Patented Dec. 3, 1907.

Application filed March 18, 1907. Serial No. 362,826.

To all whom it may concern:

Be it known that I, THEODOR ZOEBL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Pitch-Indicating Devices for Graphophones and the Like, of which the following is a complete specification.

This invention relates to improvements in pitch indicating devices for graphophones and the like and more particularly to a pitch indicating device adapted to be adjusted to meet the varying requirements caused by wear of the speed regulating device of the machine.

The object of this invention is to provide a pitch indicating device by means of which the speed of the record may be regulated to produce any desired pitch in the reproduction of sounds, and in which it will only be necessary to primarily adjust the device to a given tone, as for instance middle C, and from that tone as a starting point the speed of the record may be adjusted to give any desired pitch.

It is also an object of the invention to provide a very cheap and simple device which will not readily get out of adjustment and which is capable of being attached to any of the ordinary makes of sound reproducing instruments.

The invention consists of the matters hereinafter described in the specification and more fully pointed out and defined in the appended claims.

In the drawings: Figure 1 is a view, partly in section and partly in elevation, of a speed governor of a graphophone and having a pitch indicating device, embodying my invention, attached thereto. Fig. 2 is a front elevation of the locking collar. Fig. 3 is an outer face view of the pointer. Fig. 4 is a side elevation thereof. Fig. 5 is a front view of the scale disk, and Fig. 6 is a perspective view of a graphophone provided with a device embodying my invention.

As shown in said drawings: 1 indicates the governor of a graphophone or other sound reproducing instrument, and 2 indicates the friction disk thereon, against which bears one end of the bell crank brake lever 3 which is pivotally supported adjacent said disk. The other arm of said lever is engaged by the inner end of the tubular adjusting rod 4 which projects through the wall 4² of the

graphophone and has threaded engagement in the bearing member 5 supported in any suitable manner in the graphophone casing. Said rod is provided with a shoulder 4² near said bearing and a spring 5¹ bears at one end against said shoulder and at the other end against said bearing and acts normally to prevent the rod from turning. A pin 6 is carried in said rod and projects from the inner end thereof and engages a spring 6¹ carried on said lever which acts to provide a uniform pressure of the bearing end of the lever on said disk. All of said parts are of the usual construction and are shown for the purpose of more clearly explaining the operation of the pitch indicator. The outer end of said rod 4 is reduced in size and rigidly engaged thereon is a flanged collar 7, the flange of which is spaced a sufficient distance from the wall 4¹ to permit the rod to be adjusted longitudinally in either direction, and is provided in its outer face with a plurality of indentations 7¹ arranged concentrically with the bore of the collar, as shown more clearly in Fig. 2.

A pointer 8 is provided in one end with an aperture to receive the rod 4 and on its inner face, or that adjacent the collar, is a projection 8¹ adapted to fit in the indentations in the flange so that the pointer may be adjusted without rotating the rod. Near its opposite end said pointer is provided with a button or knob 8² by means of which it may be adjusted. The end of the rod 4, outwardly from the pointer, is screw threaded and engaging thereon is a lock nut 9 and a nut 9¹ by means of which the pointer is rigidly locked in place against the collar.

A scale disk 10, of any preferred material, is rigidly engaged in any desired manner on the wall 4¹ of the graphophone, but as shown it is provided with apertures 10¹ near the periphery thereof to receive screws or other attaching means. Said disk, as shown, is provided with a straight upper margin adapted to fit closely beneath the top plate 4³ of the graphophone, when in position, so that no skill is necessary to properly adjust it. A slot 10², through which the rod projects, extends downwardly from the edge of a sufficient distance so that the axis of said rod coincides with that of the disk. Said disk, as shown more clearly in Fig. 5, is provided with a plurality of musical symbols 10³ indicating various degrees of pitch and in ac-

cordance with which the pointer is adjusted to give the proper speed to produce the desired tones.

The operation is as follows: The disk is 5 attached to the wall of the graphophone in such manner that the rod protrudes through its slot and the speed of the record is adjusted by means of said rod so as to produce a given tone, for example middle C. The 10 pointer is then turned to middle C on the disk, and locked in place by means of the lock nut. Then by turning the rod in either direction the pointer is moved over the scale to any other symbol and the adjustment of the rod 15 causes a corresponding increase or decrease of speed of the record and produces a correspondingly higher or lower tone. The scale is also provided with a series of numerals near its periphery corresponding with the 20 various symbols, so that the pitch may be adjusted according to number if the operator is not familiar with the musical symbols.

Obviously many variations of the scale on the disk may be provided and the device 25 may be attached to any of the usual types of sound reproducing machines and many details of construction may be varied without departing from the principles of my invention.

30 I claim as my invention:

1. In a device of the class described the combination with a casing 4', of a speed governor therein, an adjusting rod 4 for said governor extending outwardly from the casing, 35 a circular scale plate 10 engaged on said casing, having a radial slot 10³ therein through which said rod passes and having a straight upper edge at the top of said slot adapted to abut against the top of the casing, a chromatic scale on said plate, arranged concentrically with its axis and having the symbols 10⁴ thereof increasing in distance apart from the beginning to the end of the scale, a flanged collar 7 on said rod, having a plurality of concentrically arranged indentions in its outer face, a pointer 8 on said rod having a projection 8' adapted to fit in said indentions and a lock nut on said rod adapted to lock the pointer in adjusted position with 45 respect to said plate.

2. In a device of the class described the combination with a speed governor of a

graphophone, of an adjusting rod 4 therefor, a flanged collar 7 rigidly engaged on said rod and provided with a plurality of indentations 7' in its outer face, a pointer 8 rotatively engaged on said rod and provided with a projection 8' on its inner face adapted to engage in any of said indentations, a nut 9 on said rod adapted to rigidly hold said 60 pointer against the collar, a set 9' therefor, a disk 10 having a straight upper edge and a radial slot extending downwardly therefrom adapted to receive said rod, a chromatic scale on said disk arranged concentrically 65 with the rod and the symbols thereof being arranged at varying distances apart, and numbers on said disk corresponding with the symbols.

3. In a device of the class described the 70 combination with a casing, of a speed governor therein, a rotary adjusting rod for said governor and projecting through the wall of the casing, a flanged collar rigidly engaged on the outer end of said rod having a plurality of indentations therein, a pointer adjustably on the rod and provided with a projection adapted to engage in said indentations, means for locking the pointer in adjusted position on the rod and a slotted scale disk 80 supported between the pointer and the wall and having a straight upper edge adapted to engage beneath the top of the casing.

4. In a device of the class described the combination with a casing of a revoluble 85 speed regulating rod projecting therefrom, a stationary disk slotted to receive said rod and having a straight upper side adapted to engage beneath the top of the casing, a plurality of symbols on said disk indicating musical tones, a collar on said rod having a plurality of indentations therein, a pointer on the rod and having a projection thereon adapted to engage in said indentations and lock nuts carried on the rod for locking the 95 pointer in adjusted position.

In testimony whereof I have hereunto subscribed my name in the presence of two witnesses.

THEODOR ZOEBL.

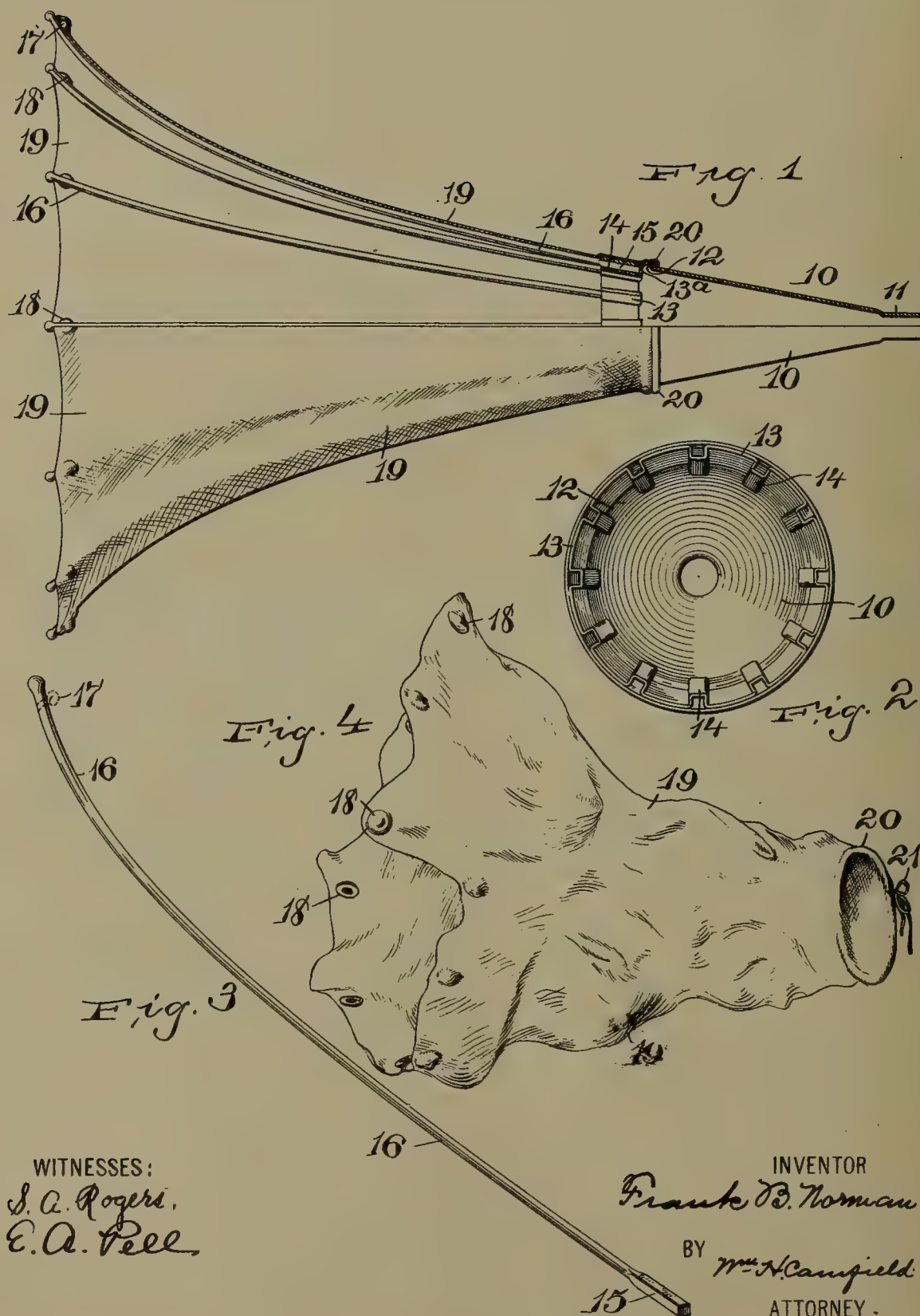
Witnesses:

J. C. GOOSMANN,
A. PRAZSKY.

No. 872,577.

PATENTED DEC. 3, 1907.

F. B. NORMAN.
PHONOGRAPH HORN.
APPLICATION FILED APR. 9, 1907.



WITNESSES:
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UNITED STATES PATENT OFFICE.

FRANK B. NORMAN, OF WEST ORANGE, NEW JERSEY, ASSIGNOR OF ONE-HALF TO SAMUEL I. KOPATOUSKY, OF NEWARK, NEW JERSEY.

PHONOGRAPH-HORN.

No. 872,577.

Specification of Letters Patent.

Patented Dec. 3, 1907.

Application filed April 9, 1907, Serial No. 367,157.

To all whom it may concern:

Be it known that I, FRANK B. NORMAN, a citizen of the United States, residing at West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonograph-Horns; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to a phonograph horn, and is designed to provide a horn that is adapted to be folded up, and is made of separable portions embodying a tapered sleeve at the small end, arms to be detachably secured thereto to form the large end, and a covering of fabric to be attached on one end to the tapered sleeve, and adapted to be buttoned or clasped to the ends of the rods forming the large end of the horn.

The invention is further designed to provide means for limiting the entrance of the rods forming the large end of the horn into the tapered sleeve, and also to provide a covering for the large end that can be folded up into a small space, this covering usually or preferably being made of oiled linen, or a similarly stiffened fabric which will throw the sound, giving it a tone that is noticeable from the absence of harshness, and this covering being detachable from both ends, it can be packed away, when the horn is in its condensed shape, with great ease.

The invention is illustrated in the accompanying drawings, in which

Figure 1 is a view half in section and half in elevation of the improved horn when it is assembled. Fig. 2 is an end view of the tapered sleeve looking into the big end thereof. Fig. 3 is a view of one of the rods, and Fig. 4 is a perspective view of the fabric covering when it is detached from the horn.

In my horn I employ a tapered sleeve 10 which is provided on one end with a portion 11 which is adapted to receive the sound for transmission, and near the larger end of the tapered portion is arranged an annular rib 12. On the end of the tapered sleeve is a strip 13 brazed, soldered or similarly secured to the tapered portion 10, and this strip is provided, at suitable points, with the corruga-

tions or channels 14, which are bent down on the inside edge as at 13^a, in Fig. 1, to form a stop, as will be described hereinafter. Into each of the channels 14 is slid the squared end 15 of a suitable rod 16, these rods having the curvature desired to give the horn the necessary shape, and on the end that forms the flared end of the horn, that is on the outer end of the rods, are the buttons 17. These buttons receive the clasp pieces or sockets 18 which are attached to the big end of the fabric covering 19. These clasp pieces 18 can be replaced by any suitable equivalent, and the fabric covering 19 can be made either elastic or non-elastic, as desired. The small end of the fabric covering for the horn is secured on the tapered sleeve between the annular rib 12 and the mouth piece 11. The small end of the fabric covering is attached as at 20, and is prevented from sliding or slipping off by the rib 12, and a suitable wire or cord 21 can be inserted in the small end of the fabric covering to make it bind tightly around the horn, this cord having either a spring or being elastic, or if desired it can be made non-elastic and can be tied.

When the horn is assembled, the tapered sleeve is taken and fitted with all the rods 16, and the fabric covering is then slid onto the tapered sleeve from its smallest end, or the end having the mouth piece, and when the small end of the fabric covering tightens up against the annular rib 12, the large end of the fabric covering can have the buttons 18 snapped over the studs 17, and the horn is complete.

It will, of course, be understood that the fabric covering can be printed or similarly ornamented to make a decorated horn, and it can be made with sufficient elasticity to it to cause a tight binding. The horn will keep its shape by reason of the squared ends of the rods 16 fitting in the channels 14, and thus being prevented from turning and marring the symmetry of the horn.

Having thus described my invention, what I claim is:—

1. A phonograph horn comprising a tapered sleeve, rods fitting in the tapered sleeve in extension thereof and individually detachable, means for preventing the rods from turning, and a fabric covering having one end secured to the tapered sleeve, and the other end secured to the projecting ends of the rods.

2. A phonograph horn comprising a tapered sleeve on its small end, the larger end of the horn being made of a fabric, and stiffening rods inside the fabric and being individually and detachably secured to the tapered sleeve.

3. A phonograph horn comprising a tapered sleeve on its small end, the large end of the tapered sleeve having rectangular channels, rods having their ends formed to fit the channels and placed therein, and a fabric covering outside of the rods secured on one end to the tapered sleeve, and having its other end secured to the rods.

4. A phonograph horn comprising a tapered sleeve, an annular rib on the tapered sleeve near its large end, rods individually and detachably secured to the large end of the tapered sleeve, and a fabric covering having one end detachably secured to the projecting ends of the rods, the small end of the fabric being secured around the tapered sleeve beyond the annular rib.

5. A phonograph horn comprising a tapered sleeve, rods secured to the tapered sleeve and projecting from its large end, means on the ends of the rods for securing a fabric covering thereto, means for attaching it to the securing means on the ends of the rods, an annular rib on the tapered sleeve, and means for binding the small end of the fabric covering around the tapered sleeve adjacent to the annular rib.

6. A phonograph horn comprising a tapered sleeve, the sleeve on its large end having a series of channels of rectangular cross-section, rods having rectangular ends to fit the rectangular channels of the sleeve to prevent the rods from turning, an annular rib on the tapered sleeve, a fabric covering, means for securing the fabric covering around the tapered sleeve adjacent to the rib, the rib acting to limit the entrance of the tapered sleeve into the fabric covering, and means for securing the other end of the fabric covering to the ends of the rods.

7. A phonograph horn comprising a tapered sleeve provided with a rectangular means on its large end for receiving a set of rods, rods having rectangular ends to fit into the rectangular receiving means of the tapered sleeve, means for limiting the move-

ment of the rods into the sleeve, and a fabric covering secured to the projecting ends of the rods and to the tapered sleeve.

8. A phonograph horn comprising a tapered sleeve, rods secured to the large end thereof and having an outward spring action, and a fabric covering inclosing the rods and limiting their spread and adapted to be stretched thereby.

9. A phonograph horn comprising a tapered sleeve, rods detachably secured to the large end thereof, the rods having an outward spring action, and a fabric covering secured to the ends of the rods and the tapered sleeve and inclosing the rods to limit their spread.

10. A phonograph horn comprising a sleeve, a set of rods secured thereto and having a spring action tending to spread them, and a fabric covering detachably secured to the sleeve and the ends of the rods and inclosing the rods to limit their spread and to be stretched thereby.

11. A phonograph horn comprising a sleeve, a series of bent rods detachably secured to the sleeve, a fabric covering inclosing the rods and stretched by them, co-operating elements on the ends of the rods and the fabric covering to detachably secure them together, and means for attaching the covering to the sleeve.

12. A phonograph horn comprising a sleeve, a set of rods adapted to project therefrom, and a fabric to form the walls of the horn, the fabric being detachable from the sleeve and the rods, and the rods being detachable from the sleeve.

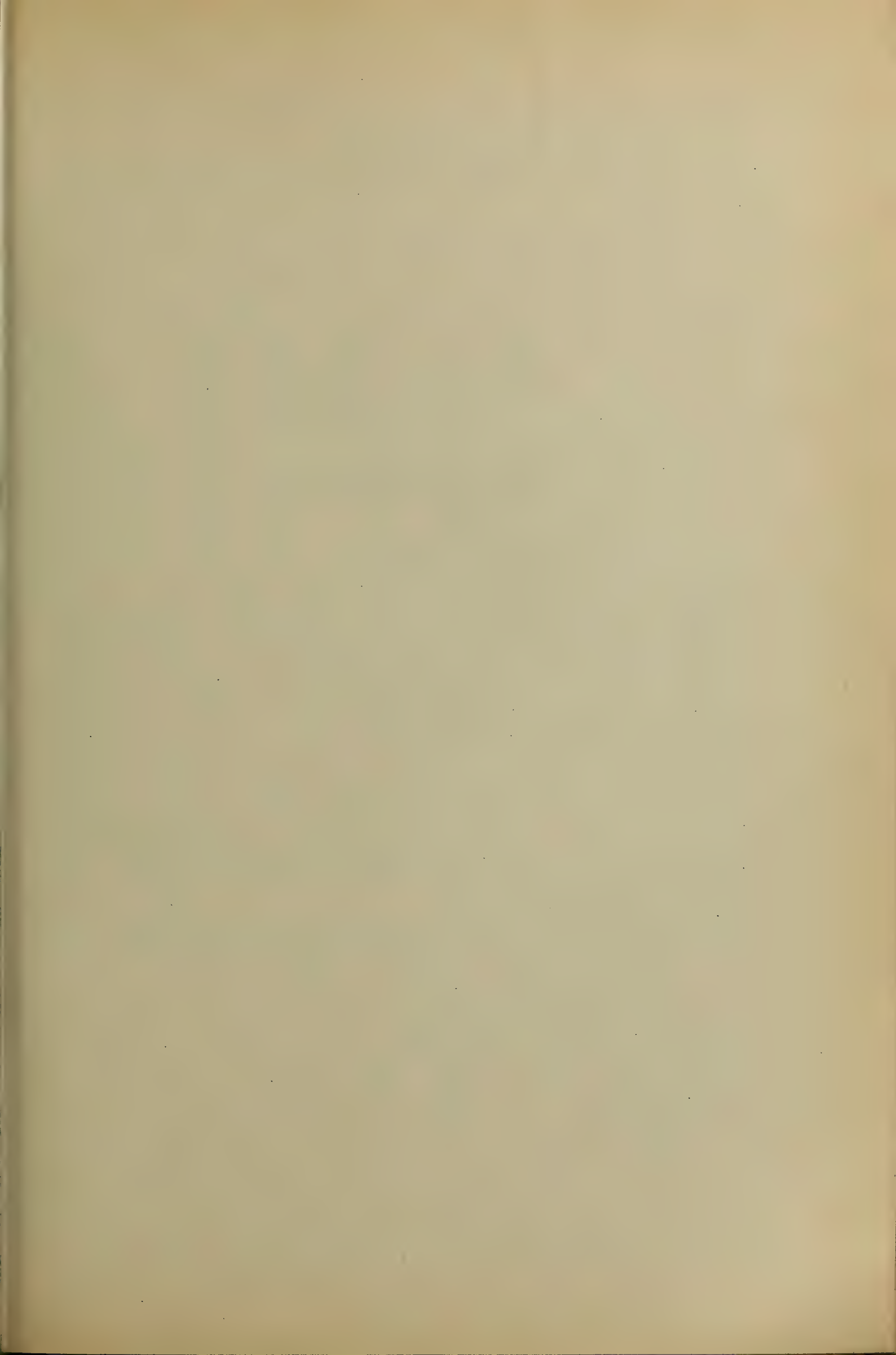
13. A phonograph horn comprising a sleeve, a set of rods projecting therefrom, a fabric covering for the rods and the end of the sleeve, and means for detachably securing the ends of the rods to the fabric covering, the securing means insuring the spacing of the rods on their ends.

In testimony, that I claim the foregoing, I have hereunto set my hand this 8th day of April 1907.

FRANK B. NORMAN.

Witnesses:

WM. H. CAMFIELD,
E. A. PELL



No. 872,586.

PATENTED DEC. 3, 1907.

H. SHEBLE.
TALKING MACHINE.
APPLICATION FILED DEC. 21, 1906.

Fig. 1,

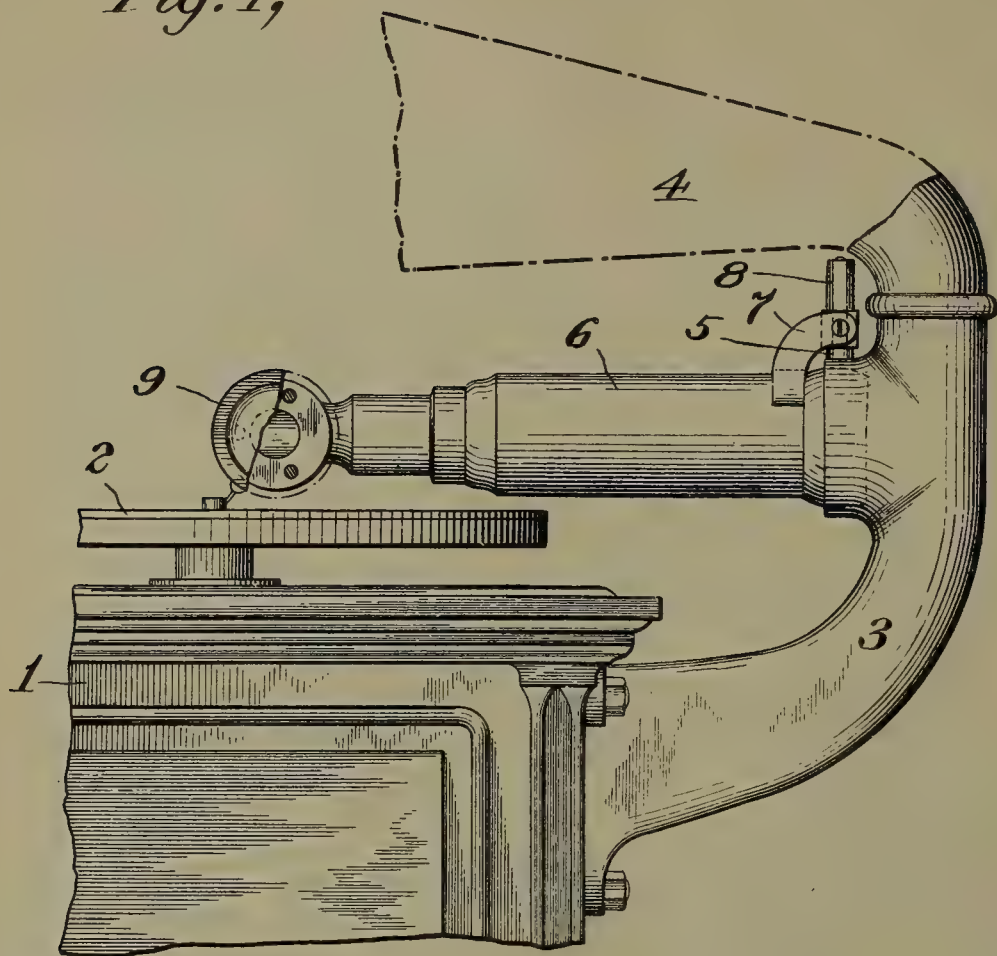


Fig. 2,

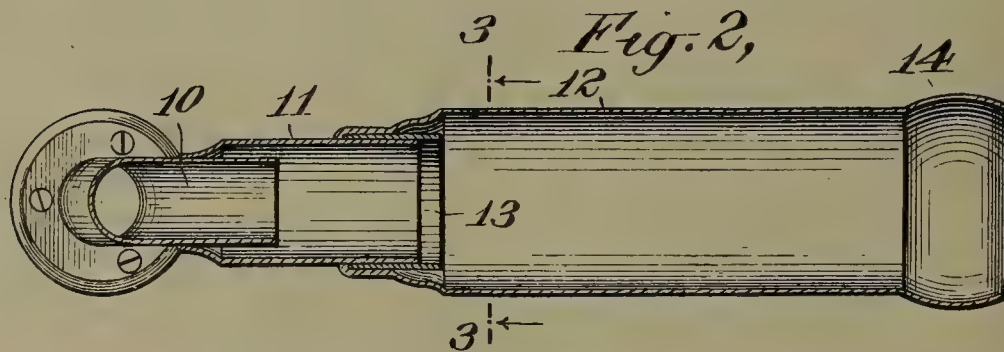
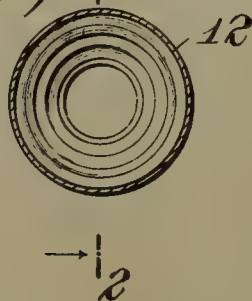


Fig. 3,



WITNESSES:

W. Edwards.
Louis Smorack

INVENTOR

Horace Sheble

BY

W. Edwards.
ATTORNEY

UNITED STATES PATENT OFFICE.

HORACE SHEBLE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

TALKING-MACHINE.

No. 872,586.

Specification of Letters Patent.

Patented Dec. 3, 1907.

Application filed December 21, 1906. Serial No. 348,910.

To all whom it may concern:

Be it known that I, HORACE SHEBLE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Talking-Machines, of which the following is a specification.

This invention concerns talking machines and relates, more particularly, to the construction of the sound-conveying and amplifying tube or horn.

The object of the invention is to provide an improved construction of such sound-conveying tube, the use of which results in a more faithful reproduction of the sound recorded.

In the talking machines heretofore constructed, it has been common to provide a sound-conveying tube tapering from end to end, the small end thereof supporting the sound-box. I have found that greater fidelity of sound reproduction can be obtained by so constructing the sound-conveying tube that the interior thereof near the end to which the sound-box is affixed consists of a plurality of sections of progressively increasing cross-sectional area. The smallest of these sections communicates with the chamber directly in rear of the diaphragm of the sound-box and is considerably smaller in cross-section than that chamber. This section is of comparatively short length, as are the succeeding ones except the last which may be of any desired length, and a tapering amplifying horn is connected to the end of this section. If desired, the sectional tube and horn may be coupled together in a manner permitting relative movement, the sectional tube, in this case, corresponding to the tone-arms now in general use. Preferably the tube and horn are circular in cross-section, the sections of the tube being cylinders of small length except the last whose length is determined by the length desired for the complete tone-arm. The sections of the tone-arm are so constructed and assembled that the end of each extends a short distance into the end of the next larger section, so that a series of air chambers or pockets are provided about the ends of the sections. By reason of this construction, the diaphragm of the sound-box can vibrate more freely as the air pressure thereon is,

under certain circumstances, considerably reduced.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which

Figure 1 is an elevation of a portion of a talking machine broken away and sectioned in part; Fig. 2 is a longitudinal section of a tone-arm on line 2—2 of Fig. 3; and Fig. 3 is a transverse section on line 3—3 of Fig. 2.

Referring to the drawings, 1 indicates the motor-box having a motor therein driving a vertical shaft adapted to carry the disk sound-record 2. A coupling member 3 is secured to the box 1, having an opening in its upper end. Supported on this member 3 is a tapering amplifying horn 4, the opening in its smaller end communicating with the upper end of the opening through the member 3. Adjacent to the other end of this opening a pin 5 is mounted on the coupling member adapted to support the tone-arm 6. For this purpose the tone-arm has secured thereto a yoke 7 having a cross-head pivoted in the ends of its arms and carrying a sleeve 8 adapted to fit over the pin 5. Over the other end of the tone-arm is mounted the sound-box 9 having the stylus bearing in the record-groove.

The tone-arm consists of a plurality of sections of progressively increasing diameter secured together with the end of each extending a short distance into the end of the next larger section. All of the sections are preferably circular in cross-section, but this may be varied if desired. The smallest section 10 is preferably a thin metal tube bent to a ninety degree curve in order to hold the sound-box in the proper position; it is comparatively short and its cross-sectional area is considerably less than that of the chamber back of the diaphragm of the sound-box. The end of this section extends into the next section 11, whose end is contracted to closely encircle the section 10. The section 11 is of greater diameter than the section 10, but it is also comparatively short; its end enters the next section 12, which is of greater diameter and whose end is contracted to closely encircle the section 11. If desired, a sleeve 13 may be inserted between the ends of the sections 11 and 12 for convenience in assembling the parts. The section 12 is of much greater length

than the sections 10 and 11, its length being such as will give the desired total length for the complete tone-arm. At its other end, the section 12 may be formed in any suitable manner to better coact with the coupling member 3, as shown at 14. The interior of the tone-arm, thus constructed, consists of a series of cylindrical sections of progressively increasing diameter and all of these sections except the last are of comparatively short length. By overlapping the sections to form air chambers or pockets within the tone-arm, the air pressure on the inner side of the diaphragm is reduced and the diaphragm can therefore vibrate more freely. By this sectional construction and by making the smaller sections of comparatively short length, so that the largest section of the tone-arm is but a short distance from the sound-box, I find that a very superior reproduction is obtained.

Having now described my invention, what I claim as new therein and desire to secure by Letters Patent is as follows:—

25 1. In a talking machine, a tone-arm consisting of a tube of substantial length pivotally mounted at one end and having a plurality of short tubular sections secured to the free end thereof, said sections and said

tube being of progressively increasing internal cross-sectional area and the end of each section extending within the next larger section and being separated from the walls thereof by space open to the interior of the tube, and a sound-box secured to the end of the smallest section, substantially as set forth.

2. In a talking machine, a tone-arm consisting of a tube of substantial length pivotally mounted at one end and having a plurality of short tubular sections secured to the free end thereof, said sections and said tube being of progressively increasing diameter, the end of each section extending within the end of the next larger section and being separated from the walls thereof by space open to the interior of the tube, and the smallest of said sections being curved in the direction of its length, and a sound-box secured to the end of said curved section, substantially as set forth.

This specification signed and witnessed this 18th day of December, 1906.

HORACE SHEBLE.

Witnesses:

S. O. EDMONDS,
W. S. EDMONDS.

A. T. E. WANGEMANN.
TONE PURIFIER.
APPLICATION FILED SEPT. 9, 1905.

3 SHEETS—SHEET 1.

Fig. 1.

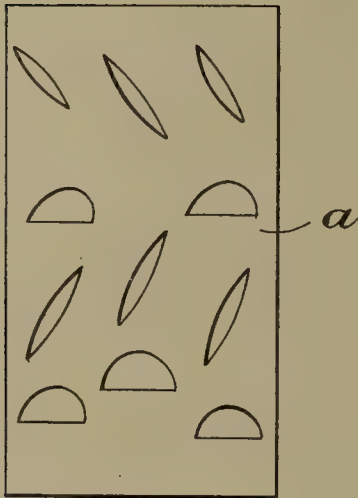


Fig. 2.

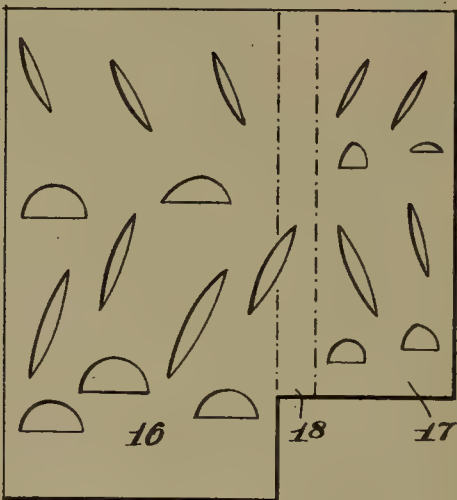


Fig. 4.

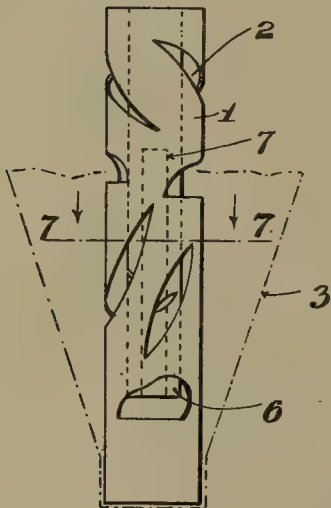


Fig. 5.

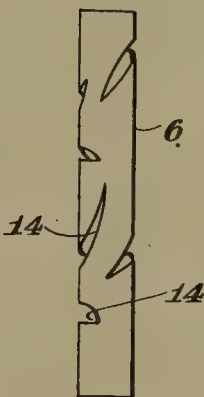


Fig. 3.

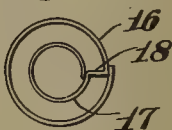


Fig. 6.

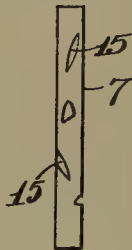


Fig. 7.

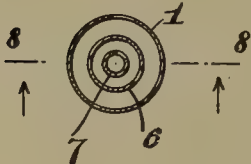
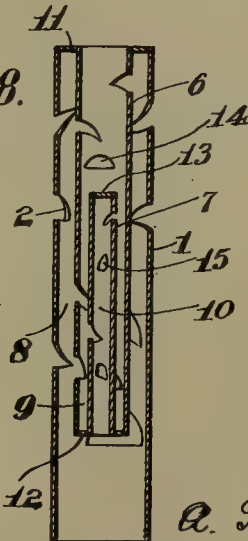


Fig. 8.



Attest:
Edgeworth Greene
Belos Holden

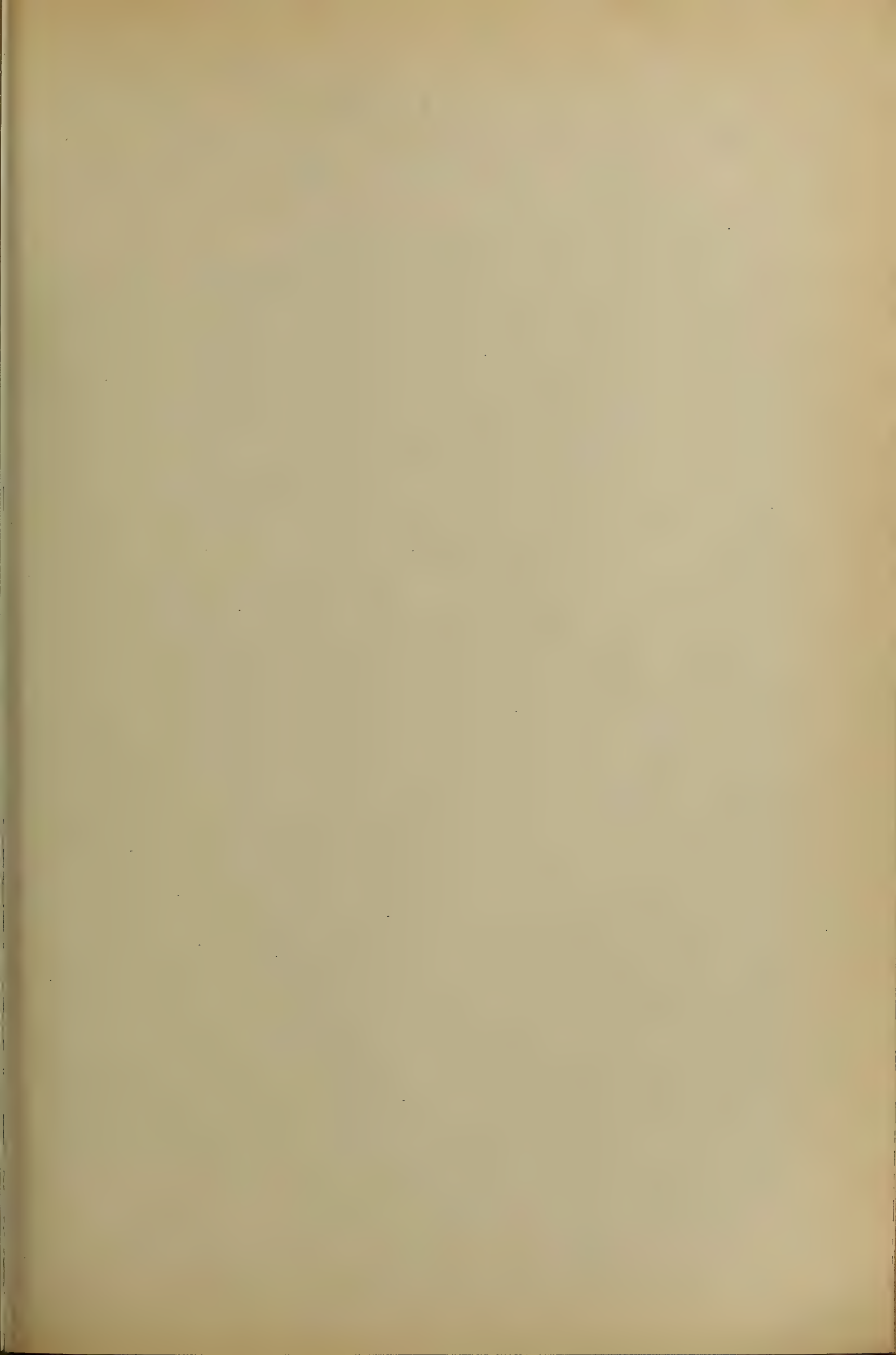
Inventor:

by

A. Theo. E. Wangemann

Frank L. Soper

Att'y.



A. T. E. WANGEMANN.

TONE PURIFIER.

APPLICATION FILED SEPT. 9, 1905.

3 SHEETS—SHEET 2.

Fig. 9.

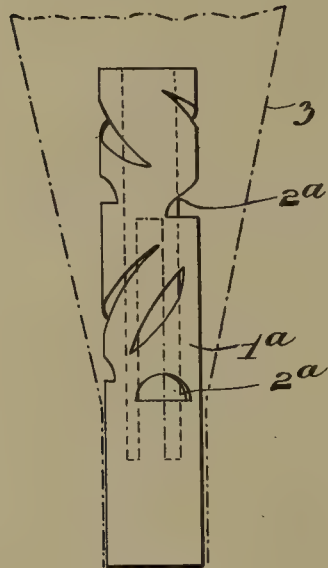


Fig. 10.

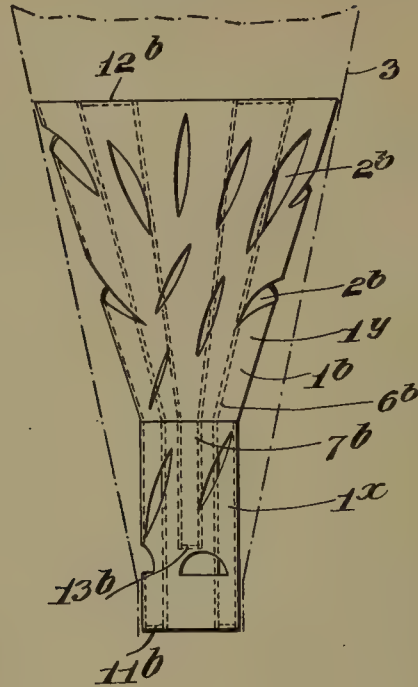


Fig. 11.

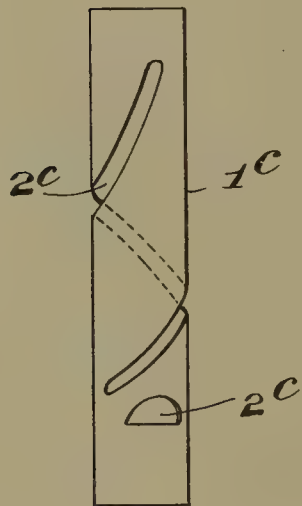
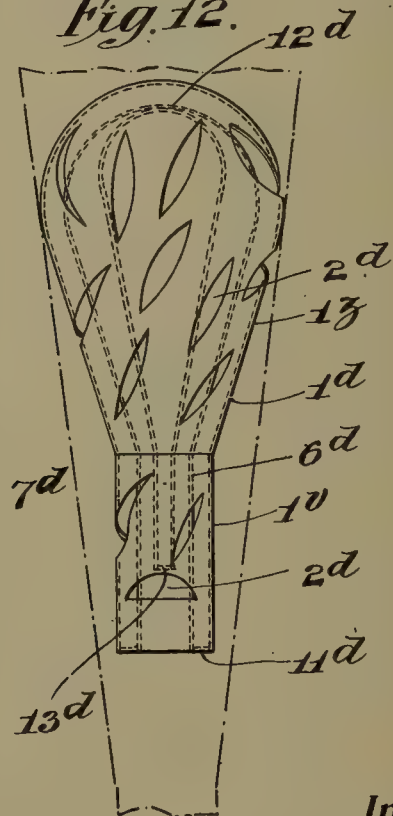
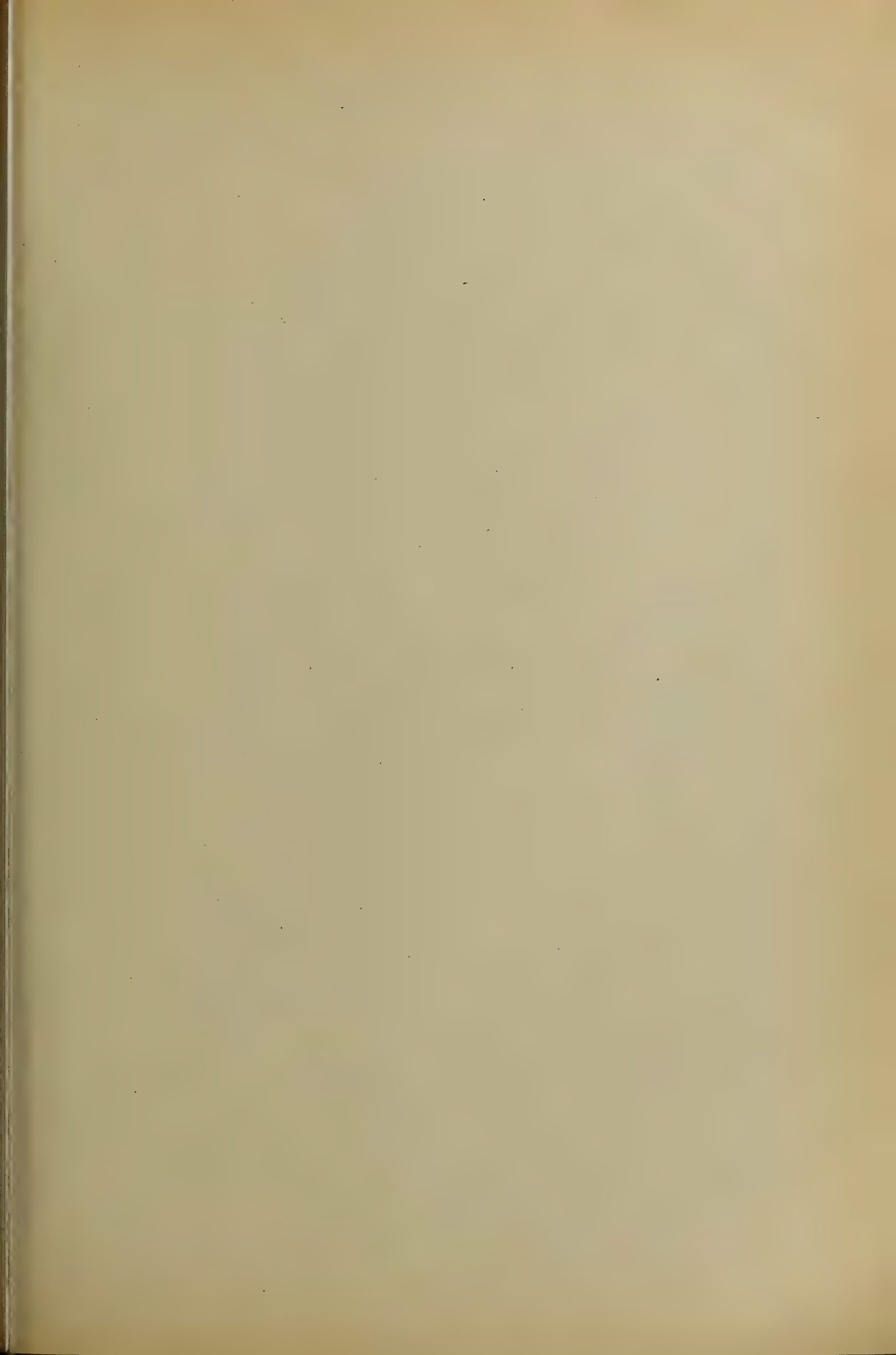


Fig. 12.



Attest:
Edgeworth
 Delos Holden

Inventor:
 A. Theo. E. Wangemann
 by *Frank L. Green* Att'y.



A. T. E. WANGEMANN.

TONE PURIFIER.

APPLICATION FILED SEPT. 9, 1906.

3 SHEETS—SHEET 3.

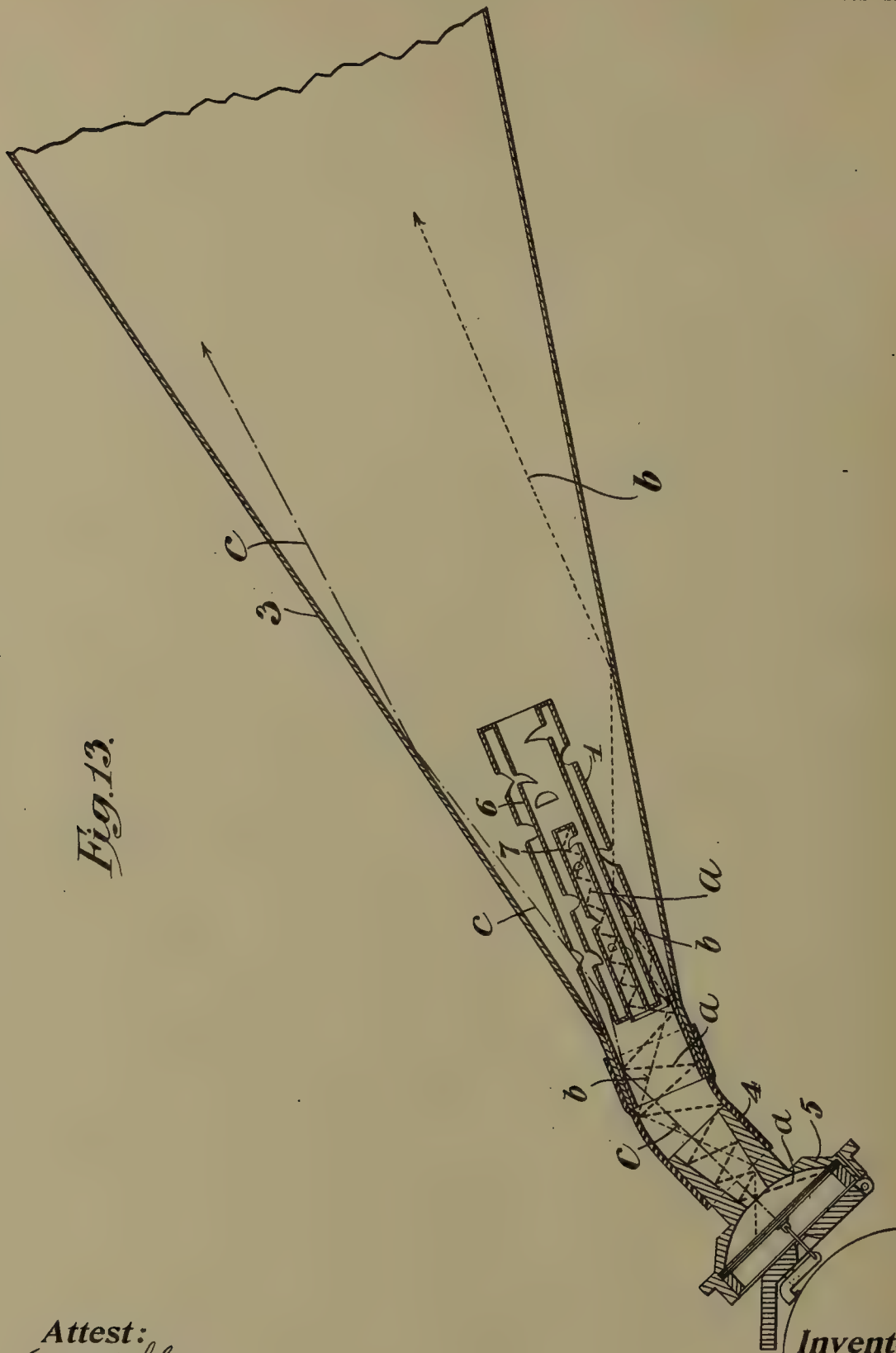


Fig. 13.

Attest:
Edgeworth Greene
Delos Holden

Inventor:
A. Theo. E. Wangemann
 by *C. Frank L. Green* Att'y.

UNITED STATES PATENT OFFICE.

ADELBERT THEO EDWARD WANGEMANN, OF WEST ORANGE, NEW JERSEY, ASSIGNOR TO
NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF
NEW JERSEY.

TONE-PURIFIER.

No. 872,592.

Specification of Letters Patent.

Patented Dec. 3, 1907.

Application filed September 9, 1905. Serial No. 277,801.

To all whom it may concern:

Be it known that I, ADELBERT THEO EDWARD WANGEMANN, a citizen of the United States, residing at West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Tone-Purifiers, of which the following is a description.

My invention relates to devices for purifying or improving the quality of tones produced by an instrument such as an Edison phonograph or other talking machine, and may be used also for recording purposes with such instruments for improving the quality of the record.

It is well known that in order to produce natural sounds, practically all the sound waves produced at a given time should reach the ear at the same instant. If, for example, a person is listening to a speaker or singer in a large hall, the waves will, of course, travel directly to the listener, but there will also be a reflection of sound waves from the walls of the room which reach the listener somewhat later and a few of these reflections will reach the listener in ample time to augment the directly received sound wave—others will travel and be reflected so often and be in consequence so weakened that their influence on the spoken word or the tones of music are nullified; yet these reflected waves have an influence on the understanding of the more direct sound waves which reached the listener first. The reflected waves plus the direct waves give to every such room or space its own tone of resonance, its own peculiar character. Now in the case of phonographic reproduction, my belief is that the reproducer diaphragm emits from the sound box waves traveling in almost every direction, so that two principal classes of waves issue therefrom into the resonating horn, namely, those which travel in a direction parallel or slightly inclined to the axis of the horn, which travel for a considerable distance without reflection and which may be called direct waves, and those whose direction of travel is considerably inclined to said axis, which are reflected after traveling a short distance, and which I prefer to term "cross vibrations". It is obvious that since the path of travel of the cross vibrations is longer than that of the direct vibrations, they will reach the listener later than

the direct and produce an unpleasant effect, a rumbling sound; they interfere constantly with the succeeding direct waves and cover up or destroy or counteract the same.

My invention has for its object the provision of means which furnish an easy outlet for direct waves and hinder or obstruct the passage of cross vibrations, whereby all, or a large part of said cross vibrations will be eliminated or converted into direct waves, and my invention consists in the features hereinafter set forth and claimed.

Reference is hereby made to the accompanying drawing in which

Figure 1 is a plan view of a perforated sheet of metal which may be used in the construction of one form of my invention. Fig. 2 is a plan view of a similar sheet which may be used in constructing another form of my invention. Fig. 3 is an end view showing how the sheet of Fig. 2 may be formed into concentric tubes. Fig. 4 is an elevation of a tone purifier embodying my invention. Fig. 5 is a detail view of one of the tubes of Fig. 4. Fig. 6 is a detail view of another tube of Fig. 4. Fig. 7 is a section on line 7—7, Fig. 4. Fig. 8 is a section on line 8, 8 of Fig. 7. Figs. 9, 10, 11 and 12 are similar to Fig. 4 and illustrate various modifications. Fig. 13 is a vertical sectional view showing one form of my invention as applied to the reproducer and amplifying horn of a phonograph. In all the views corresponding parts are indicated by the same reference numerals.

My invention in its simplest form comprises a single tube which may be formed from the Sheet 1, Fig. 1, or which may be the tube 1 of Fig. 4, 1^a of Fig. 9, 1^b of Fig. 10, 1^c of Fig. 11, or 1^d of Fig. 12. The walls of the tube are provided with apertures or perforations 2, 2^a, 2^b, 2^c and 2^d respectively. This tube should be used in connection with an amplifying horn, being inserted and held in the small end of the horn 3, the said horn being connected by the usual flexible tube 4 to the reproducer 5 of a phonograph or other talking machine or when it is desired to produce a record to the recorder of a similar instrument. The end of the tube which is farthest from the reproducer is preferably closed, although it may be partly open or entirely open. I have found, however, that superior results are secured by the use of a plurality of tubes of different diameters se-

cured together concentrically, the walls of each of the tubes being perforated and the spaces between the tubes forming channels.

Thus I may use three tubes, 1, 6, and 7 (see 5 Figs. 4 to 8). The tube 6 is placed within the tube 1 and the tube 7 is placed within the tube 6, thus forming three channels 8, 9 and 10. In order to secure the best results the channel 8 should be open at the end nearest 10 the reproducer and closed at the opposite end by a wall 11. The channel 9 should be open at the end farthest from the reproducer and closed at the opposite end, as by a wall 12, and the channel 10 should be open at the end 15 nearest the reproducer and closed at the end farthest therefrom, as by a wall 13. In each case adjacent or adjoining channels are closed at opposite ends. The sound waves or vibrations cannot pass through the device 20 from end to end but must either pass through the walls thereof or be entirely smothered. The tubes 6 and 7 are provided with apertures 14 and 15 respectively. The apertures 2, 14 and 15 may if desired be uniform in size and shape and arranged with regularity or 25 symmetry, but I prefer to make them of diverse shapes and sizes and arranged without regularity or symmetry, as I have obtained superior results in the latter case.

30 It should be noted that the tube 6 is shorter than the tube 1 and the tube 7 is shorter than the tube 6. In some cases only two tubes can be used, namely, the tubes 16 and 17 of Fig. 3. If desired, the number of 35 concentric tubes may be increased, the tubes being arranged in each case concentrically and with adjacent channels closed at opposite ends as previously described. I have constructed in this manner tone purifiers 40 consisting of as high as seven tubes and have secured excellent results therefrom, but for ordinary purposes three tubes, as shown in Fig. 8 will suffice.

A multitubular device of the character described may be constructed from a single 45 sheet of metal by cutting it to the proper shape, perforating the same and then rolling it into tubes beginning always with the smallest. Thus in Fig. 2 a sheet consisting of sections 16, 17 and 18 is perforated as 50 shown. The section 17 is then rolled into tubular form and soldered (see Fig. 3). The section 18 is bent away from the tube 17 and the section 16 is then rolled or bent into tubular form and soldered, the section 18 forming a 55 web by which the sections are held together. The channel ends may be closed as each tube is formed. Obviously any number of concentric tubes can be produced in this manner.

60 The device of Fig. 9 is similar to that of Fig. 4, except that the distance of the apertures 2^a from the lower end of the tube 1^a is greater than the distance of the apertures 2 from the lower end of the tube 1. Both 65 devices are, however, so situated with re-

spect to the amplifying horn 3 that the lowest aperture occurs at the point where the horn begins to increase in diameter.

In Fig. 10 the tube 1^b is composed of two sections, a cylindrical section 1^x and a taper- 70 ing or flaring section 1^y. Within the tube 1^b is a similarly shaped tube 6^b and within the tube 6^b is a similarly shaped tube 7^b. The channels thus formed are closed at opposite ends by the walls 12^b, 11^b, and 13^b respec- 75 tively.

The device of Fig. 11 consists of a single tube 1^c. This tube may be used in connection with other tubes if desired. That is, it may replace the tube 1 of Fig. 4. One of the 80 apertures 2^c consists of a spiral making one complete turn about the axis of the tube as shown.

In Fig. 12 the tube 1^d is composed of two sections, a cylindrical section 1^v and a bulb 85 1^z. Within the tube 1^d is a similarly shaped tube 6^d and within the tube 6^d is a similarly shaped tube 7^d. The channel between 1^d and 6^d is closed by a wall 11^d; the channel between 6^d and 7^d is closed by reason of the 90 two sections being joined together at 12^d; and the channel formed by the tube 7^d is closed by a wall 13^d. The devices of Figs. 10 and 12 are adapted by reason of the enlarged portions 1^v and 1^z respectively to engage the 95 tapering portion of the wall of a horn, as indicated in Fig. 12 and may be so used.

As previously stated, the tone purifier should be held in the small part of the amplifying horn, but this does not mean that the 100 device must be located at the very narrowest part of the horn as shown in Fig. 13; they may be held at some distance therefrom, in any portion of the horn the area of which is small as compared with the outlet of the 105 horn. Furthermore, two or even more of the devices may be used in a single horn, being placed at intervals along its length.

With the tone purifier placed in the amplifying horn 3 and connected to the phono- 110 graph reproducer 5, I have discovered by experiment that the quality of tones given out by the instrument are greatly superior to the tones produced when the tone purifier is absent. My theory of the operation of the de- 115 vice as previously explained is that the cross vibrations are either eliminated by being smothered in the tone purifier or are converted into direct waves. Thus I have indicated by the dotted line *a* the path of a 120 cross vibration which is smothered in the tone purifier. I have indicated by dotted line *b* the path of a cross vibration which is converted into a direct wave by the tone purifier. It will be noted that the relative ar- 125 rangement of parts is such that practically all the direct waves or vibrations pass through the tone purifier as indicated by the line *c*, indicating the path of such wave, and I know by experiment, that the volume of 130

sound is not diminished to the slightest degree by the use of the device described. On the other hand, the character of the woody tone of clarinets, oboes, of the singing tone of violins, cellos, etc., and the brassy tone of cornets, etc. are made more natural by the use of my invention, and as a result in the reproduction of band playing or orchestral music, the tone of each instrument is more easily distinguished and more pleasing to the ear.

My invention is also capable of use in other forms of phonic apparatus, such as stethoscopes, telephonic transmitters and receivers, etc. for the purpose of purifying the tones thereof. The relative lengths and diameters of the tubes may of course be varied to suit the particular requirements of the instruments last named.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is as follows:

1. As a new article of manufacture, a tone purifier consisting of a plurality of concentric tubes secured together and forming channels, adjacent channels being closed at opposite ends, substantially as set forth.

2. As a new article of manufacture, a tone purifier consisting of a plurality of hollow members of different diameter secured together one within another and forming channels, adjacent channels being closed at opposite ends, substantially as set forth.

3. As a new article of manufacture, a tone purifier consisting of a plurality of concentric tubes secured together, the walls of said tubes being provided with apertures, substantially as set forth.

4. As a new article of manufacture, a tone purifier consisting of a plurality of hollow members of different diameter secured together one within another, the walls of said members being provided with apertures, substantially as set forth.

5. In a phonograph or talking machine, the combination with a reproducer or recorder and an amplifying horn, of a tone purifier situated within the small end of said horn and comprising a tube, the side walls of which are provided with apertures, substantially as set forth.

6. In a phonograph or talking machine, the combination with a reproducer or recorder and an amplifying horn, of a tone purifier situated within the small end of said horn and comprising a tube the side walls of which are provided with apertures and which is closed in an axial direction, substantially as set forth.

7. In a phonograph or talking machine, the combination with a reproducer or recorder, and an amplifying horn, of a tone purifier situated within the small end of said horn and consisting of a plurality of concentric tubes secured together and forming channels, adjacent channels being closed at opposite ends, substantially as set forth.

8. In a phonograph or talking machine, the combination with a reproducer or recorder, and an amplifying horn, of a tone purifier situated within the small end of said horn and consisting of a plurality of concentric tubes secured together and forming channels, the channel of greatest diameter being open at the end nearest the reproducer and closed at its opposite end, substantially as set forth.

9. In a phonograph or talking machine, the combination with a reproducer or recorder, and an amplifying horn, of a tone purifier situated within the small end of said horn and consisting of a plurality of concentric tubes secured together and forming channels, adjacent channels being closed at opposite ends, and the channel of largest diameter being open at the end nearest the reproducer, substantially as set forth.

10. In a phonograph or talking machine, the combination with a reproducer or recorder and an amplifying horn, of a tone purifier situated within the small end of said horn and consisting of a plurality of concentric tubes secured together and forming channels, the walls of one or more of said tubes being provided with apertures, substantially as set forth.

This specification signed and witnessed this 31st day of August 1905.

ADELBERT THEO EDWARD WANGEMANN.

Witnesses:

DELOS HOLDEN,
FRANK L. DYER.

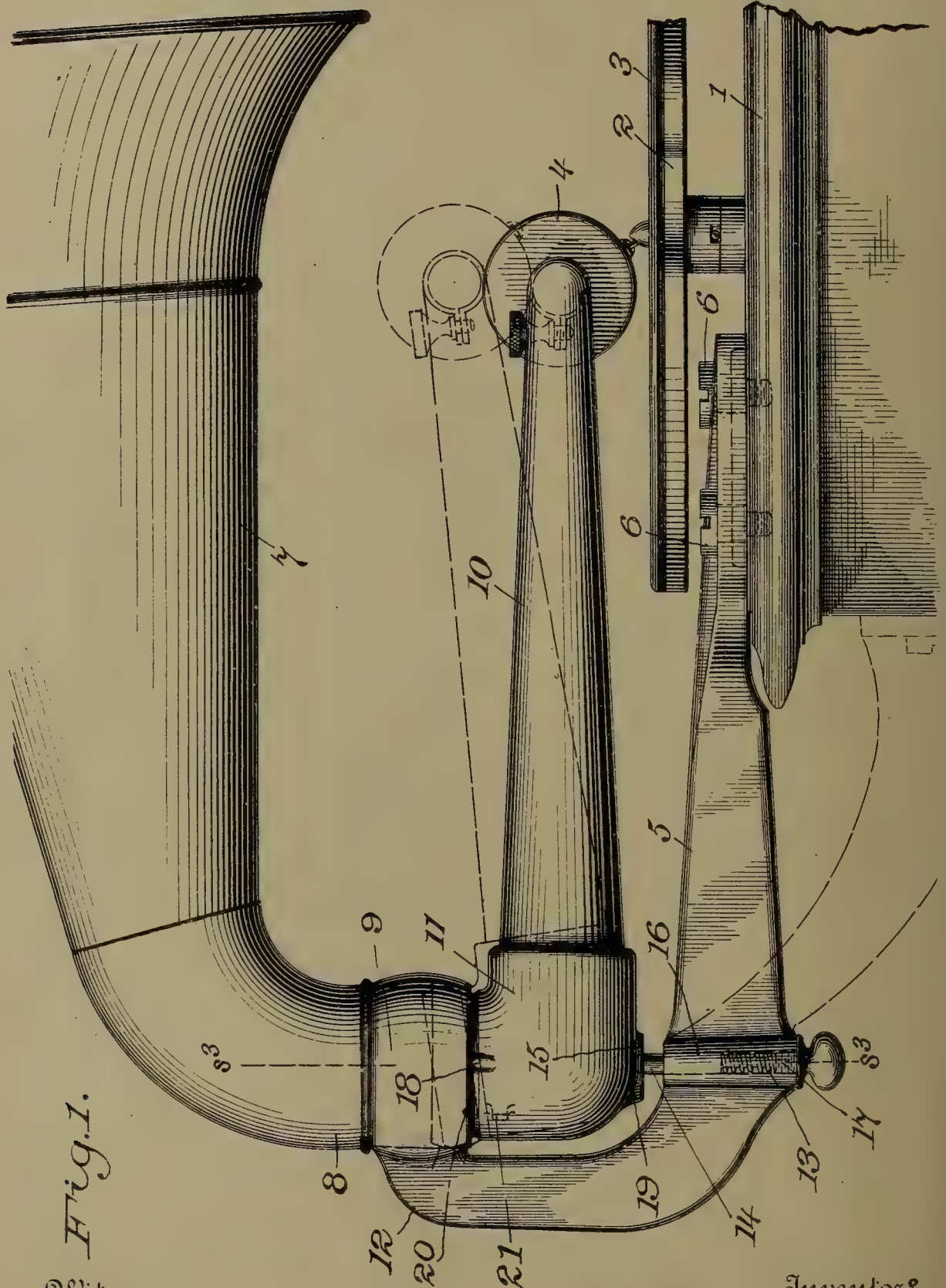
No. 872,783.

PATENTED DEC. 3, 1907.

H. B. BABSON & A. HAUG.
TALKING MACHINE.

APPLICATION FILED FEB. 7, 1906.

2 SHEETS—SHEET 1.



Witnesses
Frank O'Connor
J. E. Pearson

Inventors,
Henry B. Babson
Andrew Haug
By their Attorney
W. H. Humphreys

No. 872,783.

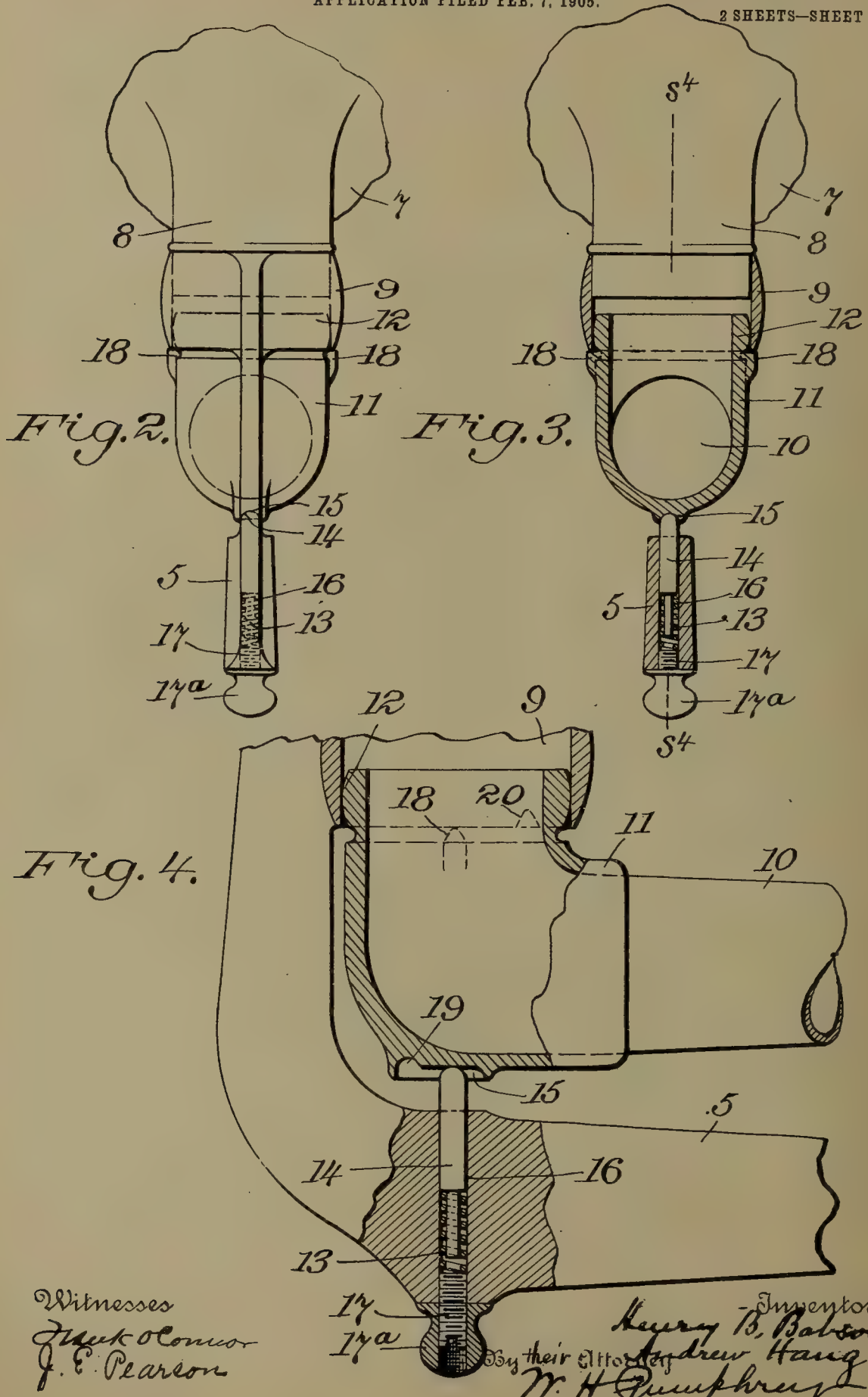
PATENTED DEC. 3, 1907.

H. B. BABSON & A. HAUG.

TALKING MACHINE.

APPLICATION FILED FEB. 7, 1905.

2 SHEETS—SHEET 2



UNITED STATES PATENT OFFICE.

HENRY B. BABSON AND ANDREW HAUG, OF NEW YORK, N. Y., ASSIGNORS TO UNIVERSAL TALKING MACHINE MANUFACTURING COMPANY, A CORPORATION OF NEW YORK.

TALKING-MACHINE.

No. 872,783.

Specification of Letters Patent.

Patented Dec. 3, 1907.

Application filed February 7, 1905. Serial No. 244,573.

To all whom it may concern:

Be it known that we, HENRY B. BABSON and ANDREW HAUG, citizens of the United States of America, and residents of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

Our invention relates generally to talking machines and more particularly to supporting means for mounting the reproducer in operative relation to the horn. In certain types of machines of this class now in general use, provision is made for supporting the horn and reproducer independently of each other, the arrangement being such as to permit the horn to be swung around into any desired position while the reproducer is either in or out of operation, without disturbing the same and at the same time to permit free movement of the reproducer without such motion being transmitted to the horn. While such an arrangement affords many obvious advantages and has received general approval, objection is made to the particular forms of mechanism heretofore employed, owing to the large number of parts, the care and accuracy required in fitting and assembling the parts to insure proper coöperation and the general complication involved in the construction which renders it expensive, difficult to adjust and altogether unsatisfactory from the point of view of both the manufacturer and user.

The present invention is designed to obviate the objectionable features above pointed out in the production of a reproducer supporting arm and mounting therefor employing a minimum number of parts of a form suitable for being manufactured at a comparatively low cost, readily assembled or disconnected and so arranged as to co-act efficiently in permitting free movement of the reproducer and its ready adjustment in or out of operative relation to the sound record.

The accompanying drawings will serve to illustrate a device suitable for carrying our invention into effect. We wish it understood, however, that we do not limit ourselves to the particular mechanism or arrangement of parts shown, as various other devices may be employed operating in substantially the same manner to produce practically the same result.

In the drawings: Figure 1 is a view in side

elevation of a support for a sound reproducer, constructed in accordance with our invention, the same being shown applied to a well known type of talking machine. Fig. 2 is a rear view thereof. Fig. 3 is a vertical section on the line s^3 , s^3 , of Fig. 1. Fig. 4 is a similar view taken on the line s^4 , s^4 , of Fig. 3.

Referring now to the drawings, 1 represents the casing of a well known form of talking machine, 2 the rotating table thereof, 3 the usual disk type of record upon the table, 4 the sound box or reproducer, 5 a rigid arm or bracket secured to the casing by screws 6, 6, or other fastening means, and 7 the horn, the small end 8 of which is removably fitted in a sleeve-like off-set 9, of the bracket 5, permitting the horn to be swung around in any position desired.

Interposed between and operatively connecting the reproducer and horn there is a sound conveyer in the form of a tubular taper arm 10, which serves to support the reproducer and at the same time forms a continuation of the sound chamber thereof. At the end adjoining the horn, the taper arm terminates in an elbow 11, which is shown as a casting having a portion 12, shaped to fit loosely within the sleeve-like off-set of the bracket 5, and thus mounted it is centered relatively to the smaller end of the horn. The sleeve serves merely as a guide for the taper arm, the elbow of which unites therewith to form in effect a ball and socket joint. The arm is supported by a spring 13, acting through a pin 14, the rounded end of which enters a groove 15, formed in the under side of the elbow, as best shown in Fig. 4. The spring and pin are seated in an opening or socket 16 of the bracket and form a yielding support upon which the arm is free to move both vertically and horizontally. The yielding action or tension of the spring may be varied by means of a screw 17, secured if desired by a lock nut 17^a. Rounded lugs 18, 18, formed at diametrically opposite points upon the elbow and bearing against the lower end of the guide sleeve, limit the action of the spring pin, which tends to force the elbow into the sleeve, and in addition to maintaining these parts in definite relation, serve as the fulcrum for the arm in its vertical movement.

In order to protect the reproducer when not in use, provision is made for locking the arm 10, at an angle such as is indicated by dotted lines in Fig. 1, in which position the

stylus clears the record. This is effected by forming a depression 19 at one end of the groove 15, in the elbow 11, into which depression the pin 14 is forced by the spring 15 and yieldingly held, limiting the movement of the arm to motion about the same as an axis and preventing vertical movement thereof. As a means of further protecting the reproducer, its horizontal movement across the record is also limited by forming notches 20, 20, in the lower end of the guide sleeve, into which the lugs 18, are forced by the spring 13, yieldingly holding the arm, when swung around against further movement, the object being to prevent persons not familiar with the machine from placing the reproducer with the stylus in such position as to oppose movement of the record. If desired, a stop lug 21 may be cast upon the elbow, as indicated in dotted lines in Fig. 1, to serve the same purpose by coacting with the bracket.

In the operation of the machine, the reproducer is perfectly free to follow the groove in the record, the yielding support and guides coacting to permit both vertical and horizontal motion of the arm, with the least possible friction or resistance opposing such motion. When moving vertically, the arm rocks on the lugs 18 and the spring pin 14, riding in the groove 15, yields, as required, to permit free motion of the shaped portion of the elbow in the guide sleeve. When moving horizontally the arm 10, turns upon the spring pin as an axis and the lugs 18 and shaped portion of the elbow are given rotary motion relatively to the guide. To lock the reproducer in an elevated position above and clear of the record, it is only necessary to raise the arm 10, until the spring pin 14, snaps into the depression 19 of the groove in the elbow. The readjustment of the reproducer is effected by pressing the arm 10 downward until the spring pin yields and reenters the groove proper. The arm 10 may be either removed or secured in position by merely turning the screw 17 to adjust the pin 14 relatively to the groove 15.

The advantages of our invention will be apparent from the foregoing description.

Having, therefore, described our invention, we claim:

1. The combination of a sound reproducer, an arm carrying the reproducer and mounted free to move vertically and horizontally, and means for yieldingly locking the arm against vertical movement only, said means serving directly as a support for the arm.

2. The combination of a sound reproducer, an arm mounted free to move vertically and horizontally, and self-engaging locking means coöperating with the arm to check its vertical motion only, said locking means directly engaging the arm as a support therefor.

3. A support for a sound reproducer comprising a sound conveyer, and a relatively fixed support upon which the conveyer rests and freely moves, said conveyer being shiftable in such relation as to be held thereby in an inoperative position.

4. The combination of a sound reproducer, a tubular arm forming a continuation of the reproducer and movable therewith, a yielding support directly engaging the arm and permitting movement thereof in planes at right angles to each other, and means for limiting the arm to movement about the support as an axis.

5. The combination of a sound reproducer, an arm movable therewith, a support directly engaging the arm and permitting free movement thereof, and means for causing the arm when elevated to be yieldingly held by the support.

6. The combination of a sound reproducer, a rigid arm provided with requisite guides, a movable arm mounted in the guides, and a pin spring-seated in the rigid arm as a support for the movable arm, said movable arm having shaped portions adapted to interlock with the pin in certain positions of adjustment.

7. The combination of a fixed arm provided with requisite guides, a spring pin centered relatively to the guides, and a tubular arm terminating at one end in a reproducer and at the opposite end in an elbow fitted in the guides and having a groove of varying depth formed therein to coöperate with the pin.

8. The combination of a fixed arm provided with an annular guide recessed at diametrically opposite points, a movable arm fitted in the guide and terminating in a sound reproducer, oppositely disposed bearings upon the movable arm coöperating with the recessed guide, and means for supporting the arms operatively assembled.

Signed at New York, N. Y. this 30th day of January, 1905.

HENRY B. BABSON.
ANDREW HAUG.

Witnesses:

W. H. PUMPHREY,
M. G. CRAWFORD.

No. 872,828.

PATENTED DEC. 3, 1907.

W. E. LEIGHTON.
REPRODUCING HORN FOR TALKING MACHINES.
APPLICATION FILED NOV. 1, 1906.

2 SHEETS—SHEET 1.

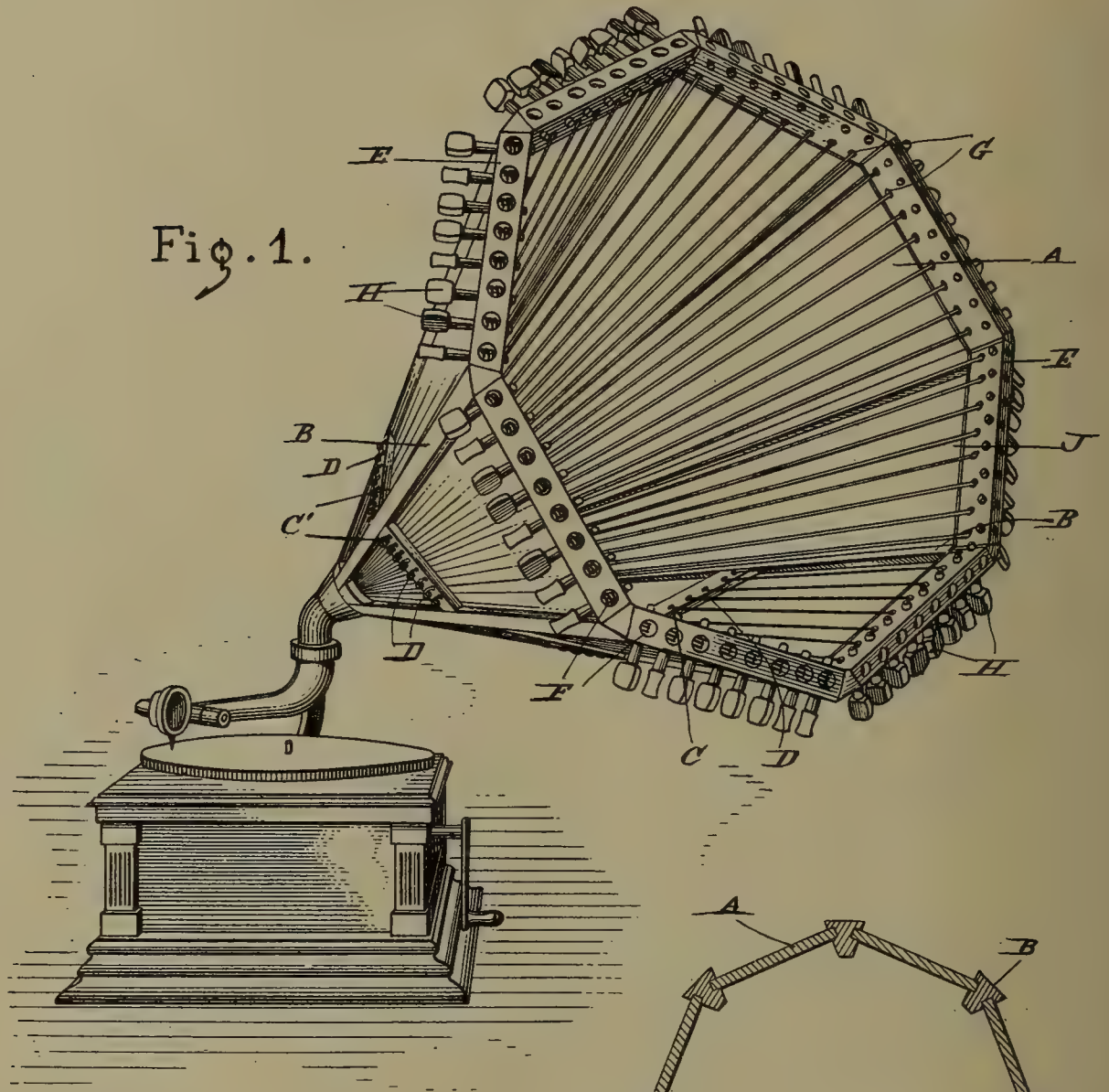
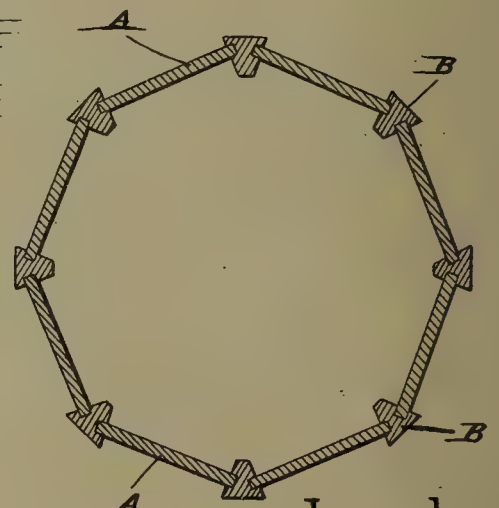


Fig. 3.



Witnesses:

James E. Alden
W. Randolph Jr.

Inventor:
William E. Leighton
by *D. A. Gourick*
Attorney.

W. E. LEIGHTON.
REPRODUCING HORN FOR TALKING MACHINES.

APPLICATION FILED NOV. 1, 1906.

2 SHEETS—SHEET 2.

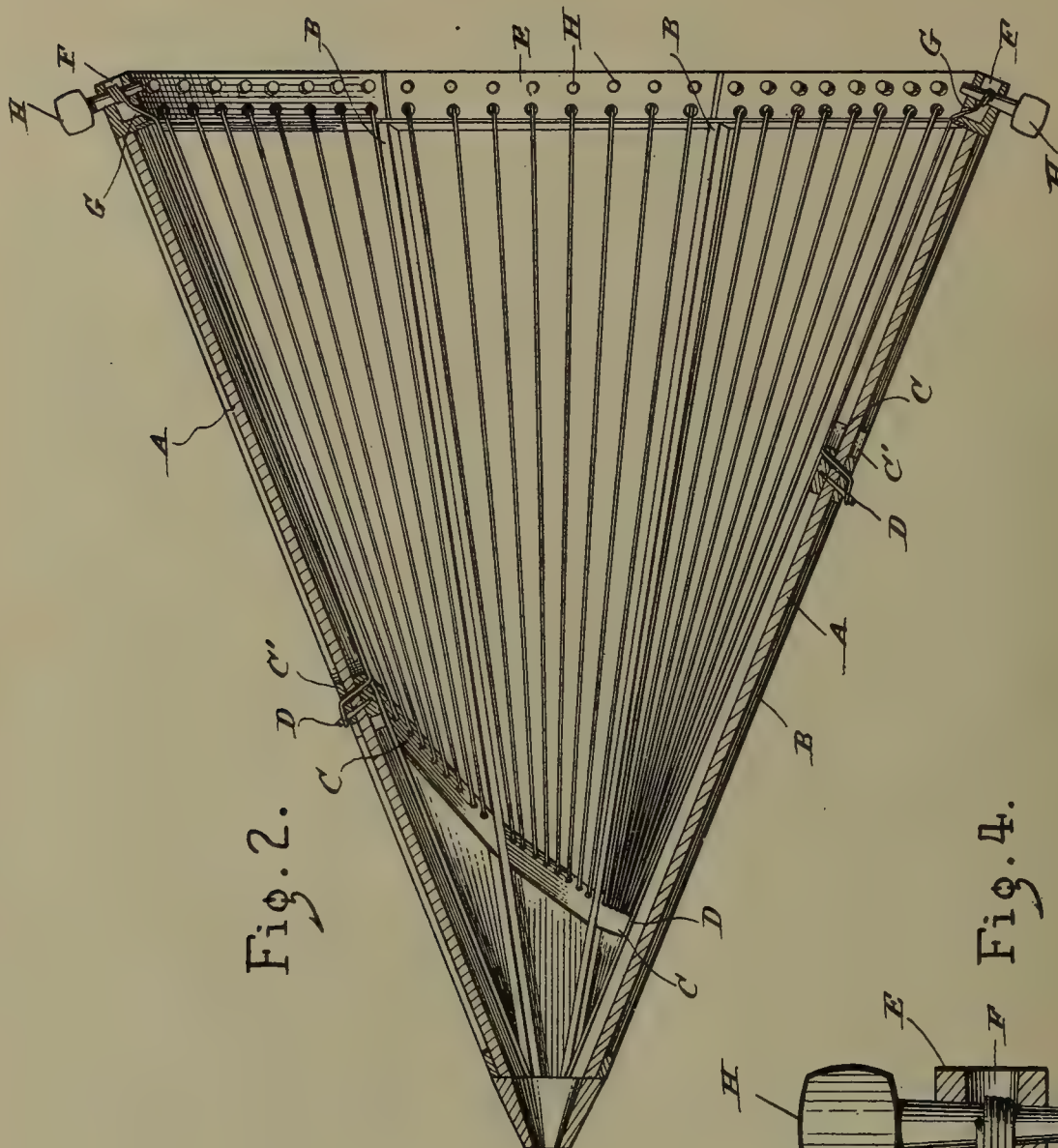


Fig. 2.

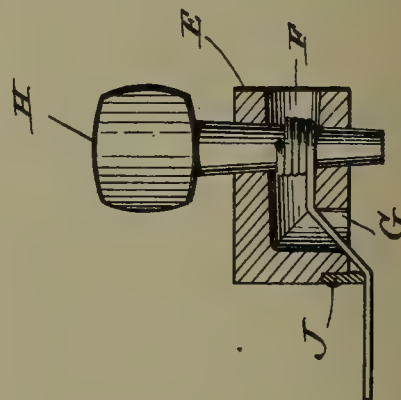


Fig. 4.

Witnesses:

Francis E. Alden
J. H. Randolph, Jr.

Inventor:

William E. Leighton
L. A. Gourick
Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM E. LEIGHTON, OF PEMBROKE, MAINE.

REPRODUCING-HORN FOR TALKING-MACHINES.

No. 872,828.

Specification of Letters Patent.

Patented Dec. 3, 1907.

Application filed November 1, 1906. Serial No. 341,642.

To all whom it may concern:

Be it known that I, WILLIAM E. LEIGHTON, a citizen of the United States, residing at Pembroke, in the county of Washington and State of Maine, have invented certain new and useful Improvements in Reproducing-Horns for Talking-Machines, of which the following is a specification.

My invention relates to the horns used on the reproducers of talking machines and has for its principal object the improvement of the horn to the end that the tones reproduced are prolonged and made more clear. This I accomplish by attaching a number of the strings to the horn which are tuned to the chromatic scale so that when a tone is made by the talking machine record the string tuned to that tone vibrates in sympathy and also the strings tuned to the harmonics of the tone.

The construction and operation of my invention will be described more in detail hereinafter and illustrated in the accompanying drawings in which—

Figure 1 is a perspective view of a conventional talking machine with my improved horn secured thereto, Fig. 2, a central longitudinal sectional view looking at one side of the inner surface of the horn, Fig. 3, a cross sectional view, and Fig. 4, a detail showing one of the keys and its mountings.

In the drawings similar reference characters indicate corresponding parts throughout the several views.

My improved horn is formed of a number of flat pieces of resonant material, such as thin pieces of wood, indicated by A, and having their edges secured in longitudinal ribs or strips B to form the horn. In the drawing the horn is shown to have eight sides but this number may be increased or diminished as desired without altering the spirit of my invention.

Secured to the pieces A inside of the horn are cleats C placed diagonally on said pieces A so that the line of cleats forms a spiral inside of the horn.

C' indicates other cleats on the outside of pieces A opposite cleats C.

D indicates pegs secured to cleats C and C'.

The outer edges of the pieces A have secured thereto relatively heavy pieces of ebony or other suitable material E having chambers F therein opening towards the front of the horn and a hole G connecting each chamber F with the interior of the horn.

H indicates keys having their stems extending through chambers F, said keys being of the kind employed in violins and other stringed instruments to regulate the tension and the consequent pitch of the strings.

I indicate strings having one end secured to pegs D and the other end secured to keys H, being passed through holes G to the key stems.

J indicates strips of metal or other rigid material secured adjacent to holes G to space the strings I from the pieces A.

In arranging my horn for use the strings I are successively tuned to the chromatic scale. When in use the tones produced by the talking machine record causes the sympathetic vibration of the strings I tuned to the tonic and its harmonics thus prolonging and clearing the tone reproduction, while the pieces A, by acting as sounding boards, strengthen and sweeten the effect produced.

Having thus described my invention what I claim is—

1. A horn for conveying sound having a multiplicity of flat sides of resonant material, cleats secured to said sides, tuning keys revolvably secured, and strings secured to said cleats and keys and tuned to the chromatic scale, substantially as shown and described.

2. A horn for conveying sound comprising a multiplicity of longitudinal ribs, thin pieces of wood secured to said ribs, cleats secured to said pieces of wood, tuning keys revolvably secured in the outer edge of the horn, and strings secured to said cleats and keys and tuned to the chromatic scale, substantially as shown and described.

In testimony whereof I hereto affix my signature in the presence of two witnesses.

WILLIAM E. LEIGHTON.

Witnesses:

S. H. LINCOLN,

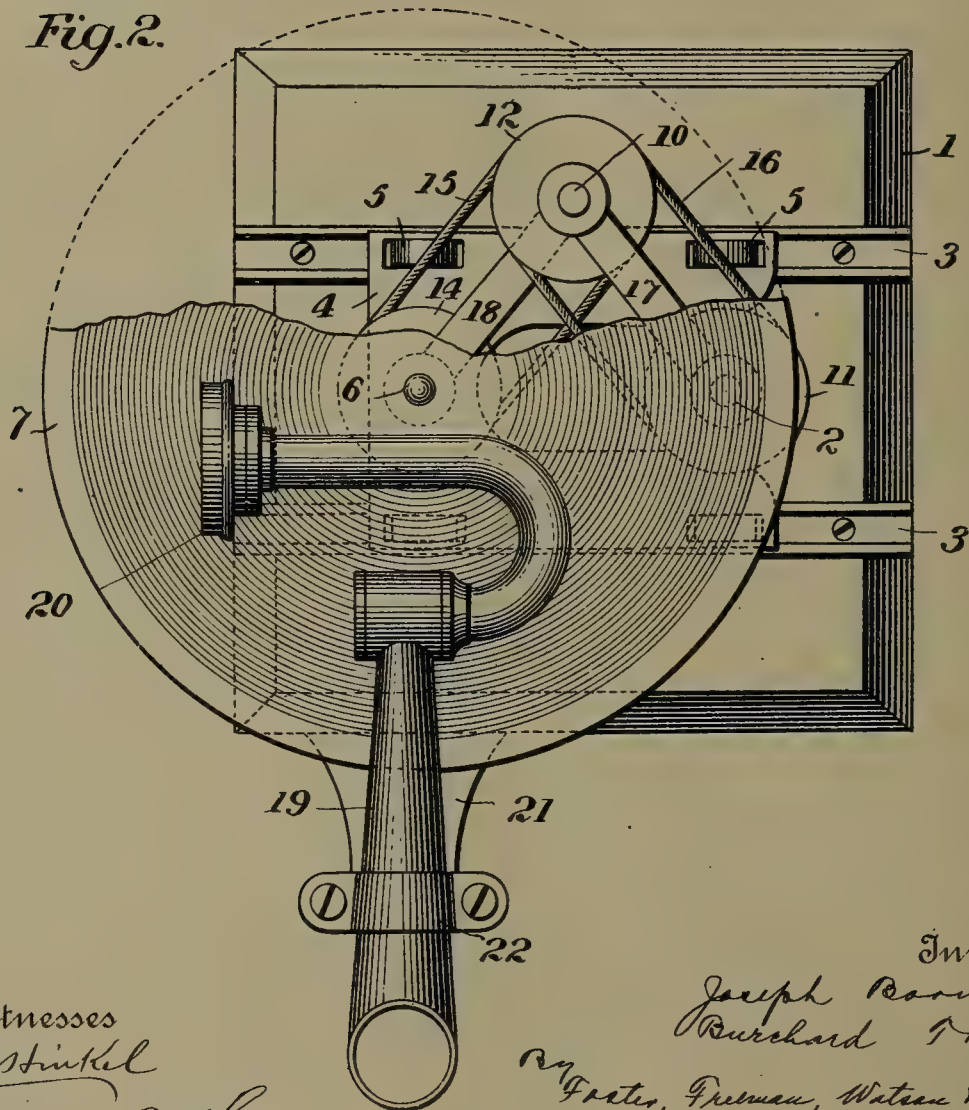
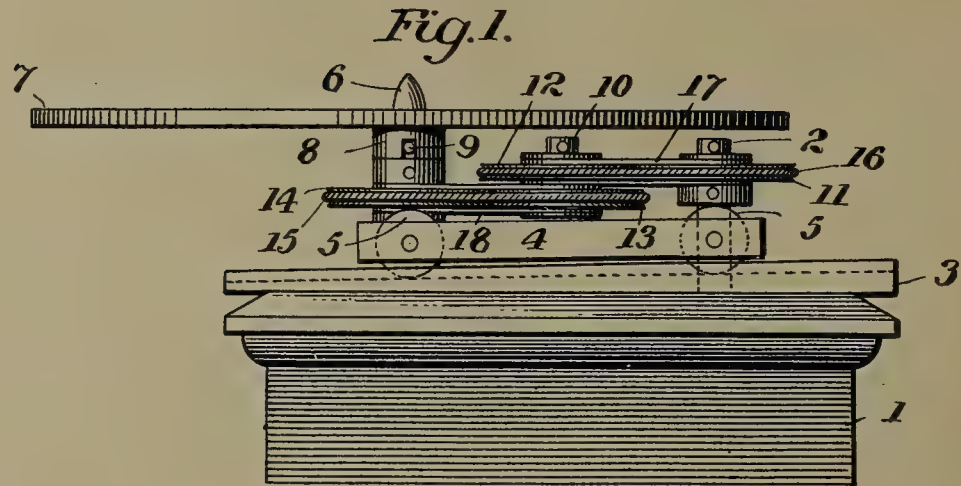
E. L. PATTANGALL.

J. BORNAND & B. THOENS.

PHONOGRAPH.

APPLICATION FILED JUNE 1, 1907.

2 SHEETS—SHEET 1.



Witnesses
J. J. Stinkell
J. J. McCarthy

Inventors
Joseph Bornand and
Burchard Thoenes
By Foster, Freeman, Watson & Co.
 Attorneys

Fig. 3.

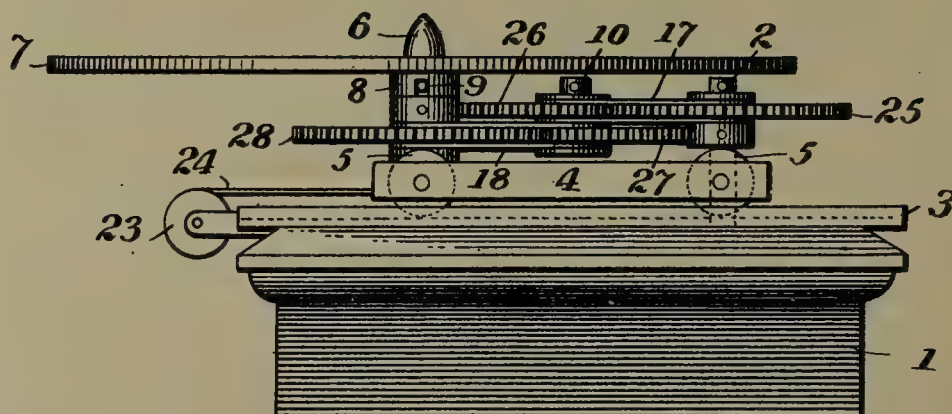
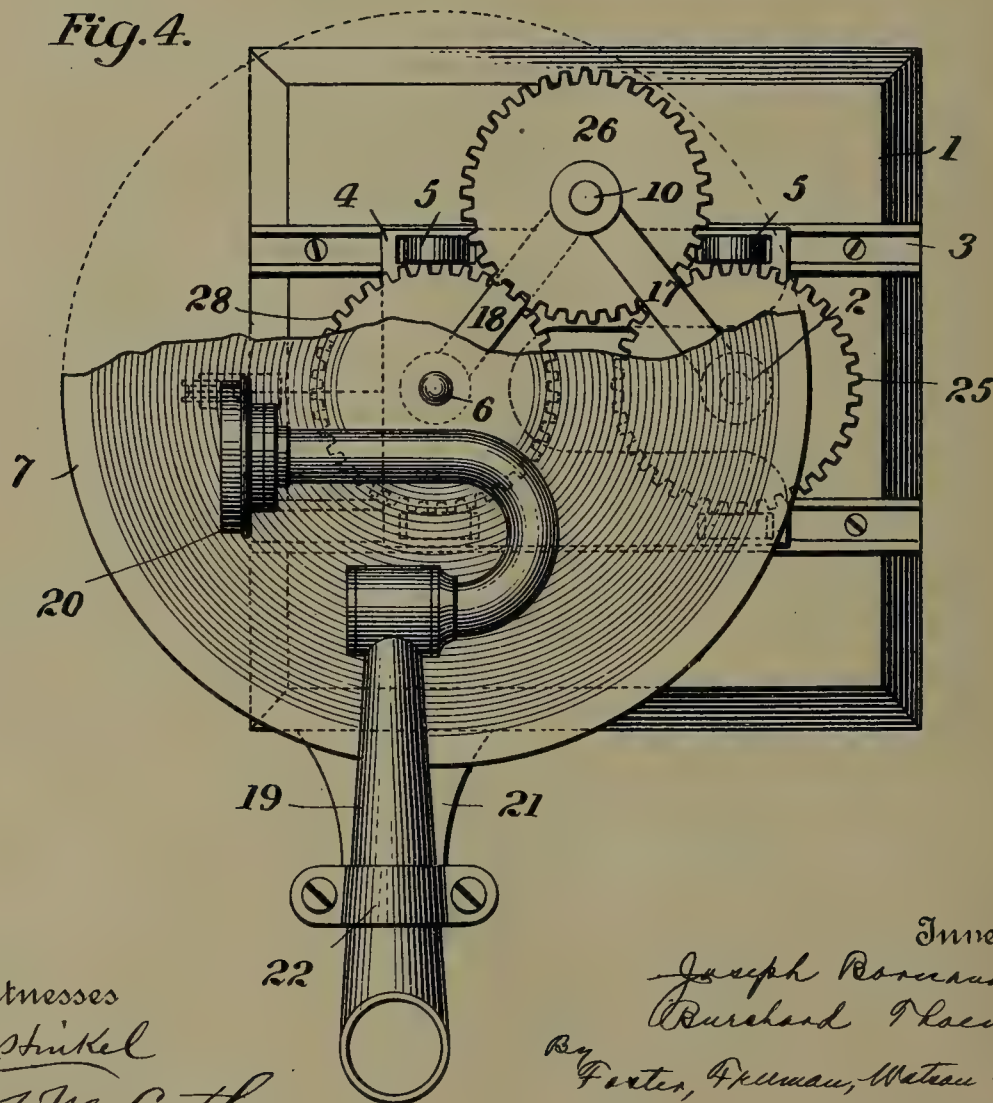


Fig. 4.



Witnesses

J. J. McKel

J. J. McCarthy

Inventors

Joseph Bornand and
Barthold Thoens.

By Foster, Freeman, Watson & Co.

Attorneys

UNITED STATES PATENT OFFICE.

JOSEPH BORNAND, OF PELHAM, AND BURCHARD THOENS, OF NEW YORK, N. Y.

PHONOGRAPH.

No. 873,013.

Specification of Letters Patent.

Patented Dec. 10, 1907.

Application filed June 1, 1907. Serial No. 376,804.

To all whom it may concern:

Be it known that we, JOSEPH BORNAND, a citizen of the Republic of Switzerland, residing at Pelham, in the county of Westchester, State of New York, and BURCHARD THOENS, a subject of the Emperor of Germany, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

The invention relates to phonographs or talking machines in which the sound tube is stationary and the record is movable.

It resides in the means for mounting the sound tube and for mounting and operating the record support, so that the record will be automatically moved by the engagement of the stylus of the sound reproducer with the spiral groove in the record. The record support is so mounted and connected with a fixed source of power that it may be driven without any interference with its motion in a straight line beneath the stylus of the reproducer.

In the accompanying drawings—Figure 1 is a side elevation showing the device; Fig. 2 is a plan of the same device; Fig. 3 is an elevation of a modified form of the device; and Fig. 4 is a plan view of this modification.

Referring particularly to Figs. 1 and 2, 1 represents a box or casing in which there may be placed any ordinary form of motor. A spindle lettered 2 extends through the top of the casing near one side and is adapted to be driven by the motor within the casing. Two parallel track-ways 3 are placed on top of the casing at opposite sides of the spindle 2. These track-ways are inclined to the horizontal and serve as supports and guides for the rollers 5 of a movable carriage or frame 4. The frame 4 has a cut away portion which permits it to straddle the spindle 2. In the frame 4 is mounted the spindle 6 which carries at its upper end the circular flat disk 7 which serves as a support for the record. This plate 7 has on its lower side a projection 8 which fits over the pin 9, passing through the spindle 6, and thus the plate is locked to the spindle and made to rotate therewith. A third spindle 10 is pivotally mounted upon two arms lettered 17 extending from the spindle 2, and also upon two pivoted arms 18 extending from the spindle 6. On the spindle 2 and between the arms

17 is mounted a sheave 11, and opposite this sheave on the spindle 10 is mounted the sheave 12. Between the arms 18 a sheave 13 is mounted on the spindle 10, and a corresponding sheave 14 is mounted on the spindle 6. These sheaves are connected by belts 15 and 16, so that any rotation of the spindle 2 is imparted to the spindle 6 and to the record support 7. The sound tube 19 and reproducer 20 are fixedly attached to the casing 1 by means of the bracket 21 and clamp 22.

In the modification shown in Figs. 3 and 4, instead of using the inclined track-ways we have provided a spring 23 connected by a band 24 to the carriage 4. This spring, like the inclined ways, tends to move the carriage in one direction. In this modification furthermore we have substituted for the sheaves and connecting belts the meshing and gear wheels 25, 26, 27 and 28. It will be understood that other forms of connecting gearing or operating means might be employed instead of the particular forms described, without departing from the main plan of my invention.

In operation the flexible connection between the spindle 6 and spindle 2 which includes the pivoted arm 17 and 18 permits the carriage to move freely towards or away from the spindle 2 without interfering with the rotation of the record support. The inclined track-ways 3 in Figs. 1 and 2 and the spring 23 in Figs. 3 and 4 are so adjusted and proportioned as to almost, but not quite, overcome the friction and inertia of the carriage and operating parts, so that very little force is required to move it in one direction. When it is desired to use the device to reproduce a record, the record is placed on the support 12 and the stylus of the reproducer 20 is placed in the outer turn of the spiral groove in the record and power is applied to the spindle 2, so as to rotate the record. The stylus will follow the spiral groove and being stationary will, by contact with that groove, move the record and its supporting parts, including the carriage, transversely beneath it.

We have found that the character of the sound produced is much improved by having the sound tube fixed and stationary instead of having movable parts. We believe that the movable parts interfere with the

proper transmission of the sound and we desire to claim broadly this feature of a fixed and immovable sound tube.

What we claim is:

5 1. The combination of a relatively fixed reproducer, a rotative record shiftable by said reproducer in a given direction, and in a straight line relatively to said reproducer, and means independent of the reproducer
10 tending to shift said record in the direction in which it is moved by the reproducer.

2. The combination with a stationary sound tube, of a carriage free to move laterally in a straight line, beneath the end of
15 said tube, a rotatable record support mounted on said carriage, stationary driving means, and flexible connections between said driving means and record support for rotating said support without interfering with its free
20 lateral motion.

3. The combination with a stationary sound tube, of a rotatable record support mounted upon a carriage free to move laterally in a straight line in either direction
25 and means independent of the stylus whereby the friction and inertia of the carriage when it is moved in one direction is almost overcome.

4. The combination with a stationary
30 sound tube, of a rotatable record mounted upon a laterally movable carriage, rollers supporting said carriage and inclined trackways upon which said rollers move.

5. The combination with a stationary
35 sound tube, of a rotatable record mounted upon a laterally movable carriage, rollers supporting said carriage, and trackways for the rollers so inclined to the horizontal as to almost overcome the frictional resist-
40 ance of the carriage to motion in one direction.

6. In a device of the class described, the combination with a driving spindle of a rotatable record support, the spindle and support being movable relative to each other, a movable spindle connected by link arms to the
45 driving spindle and the spindle of the record support, and connections between the spindles whereby the record support is rotated from the driving spindle. 50

7. In a device of the class described, the combination with a driving spindle of a rotatable record support, the spindle and support being movable relative to each other, sheaves carried by said spindle and the
55 spindle of the record support, a movable spindle connected to said spindles by pivoted link arms upon each side of said sheaves, two sheaves rigidly connected to said movable spindle between the link arms, and flexible
60 belt connections between said sheaves whereby the record support is operated from said driving spindle.

8. The combination with a stationary sound tube of a rotatable record support, 65 of a laterally movable carriage on which the record support is mounted, a stationary driving spindle, link arms connecting the driving spindle and the spindle of the record support with a movable spindle, and con- 70 nections between the spindles whereby the record support is driven in its rotation from the driving spindle.

In testimony whereof we affix our signatures in presence of two witnesses.

JOSEPH BORNAND.
BURCHARD THOENS.

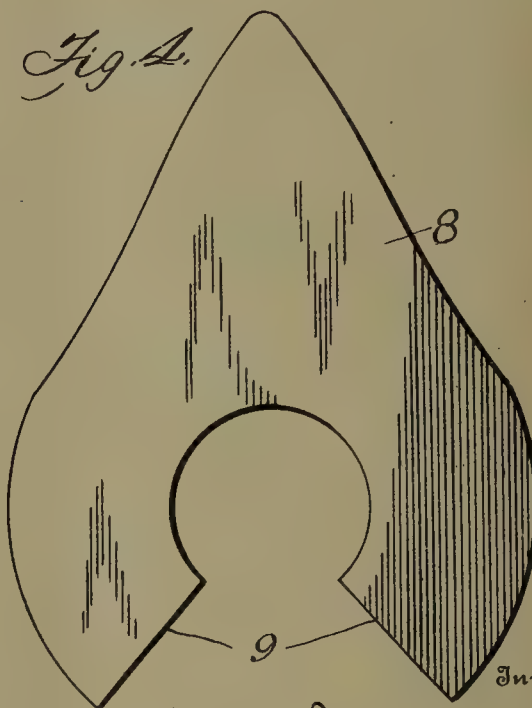
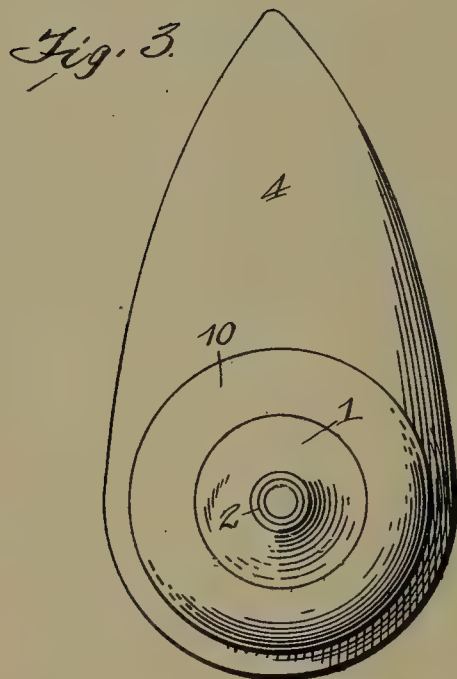
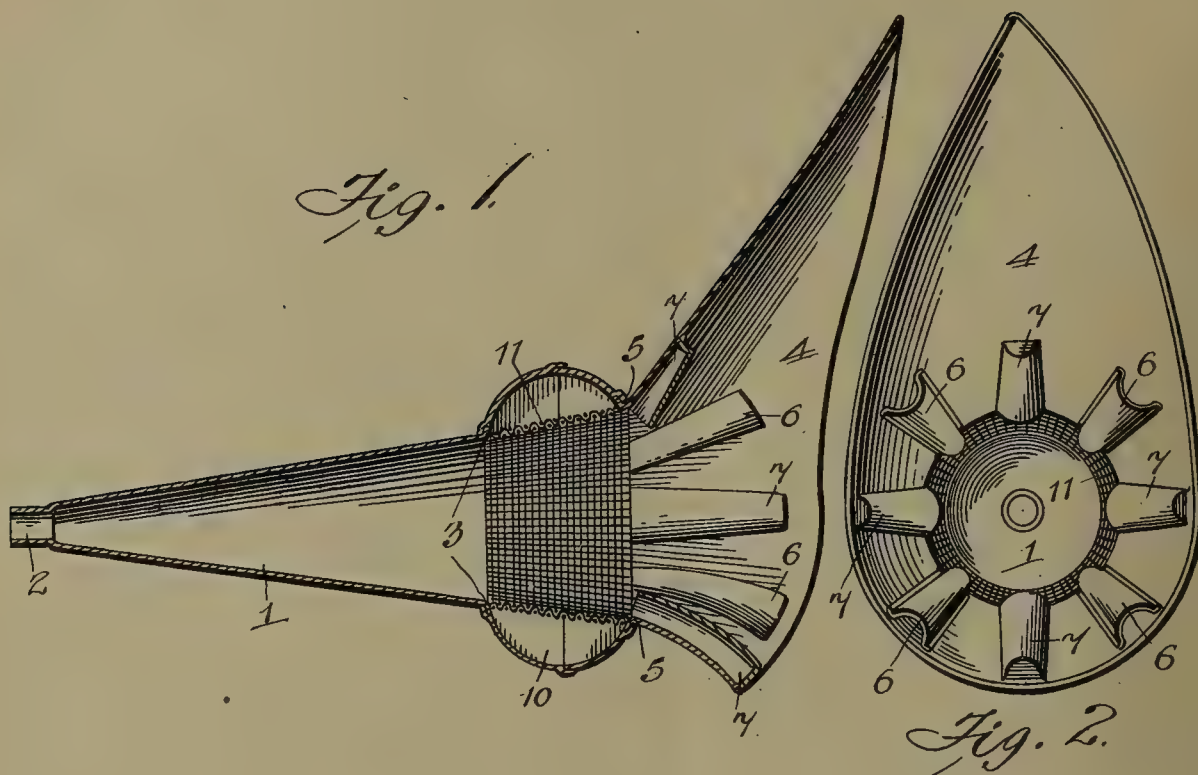
Witnesses:

R. W. LEVY;
L. F. FROELICH.

No. 873,643.

PATENTED DEC. 10, 1907.

J. F. WHEELER.
SOUND AMPLIFYING HORN.
APPLICATION FILED MAY 15, 1907.



Witnesses

Chas. H. Davis,

Myron G. Clear

By

J. F. Wheeler,

C. L. Parker

Attorney

UNITED STATES PATENT OFFICE.

JAMES F. WHEELER, OF GRAND VALLEY, COLORADO, ASSIGNOR OF ONE-HALF TO FRANK W. DE WITT, OF GRAND VALLEY, COLORADO.

SOUND-AMPLIFYING HORN.

No. 873,643.

Specification of Letters Patent.

Patented Dec. 10, 1907.

Application filed May 15, 1907. Serial No. 373,749.

To all whom it may concern:

Be it known that I, JAMES F. WHEELER, a citizen of the United States, residing at Grand Valley, in the county of Garfield and State of Colorado, have invented certain new and useful Improvements in Sound-Amplifying Horns, of which the following is a specification.

My invention relates to horns used in connection with phonographs and like instruments, and particularly contemplates the provision of an improved construction whereby sound may be amplified and created more distinct in its passage therethrough.

My invention further resides in the features of construction hereinafter described with reference to the accompanying drawing in which like numerals are used to designate like parts throughout the several figures, and in which,

Figure 1 is a central longitudinal sectional view taken through my improved horn. Fig. 2 is an end view looking forwardly into the same. Fig. 3 is a rear end elevation, and Fig. 4 is a face view of the blank used to form the bell end of the horn.

In the practical embodiment of my invention I provide a horn comprising an elongated, gradually enlarging throat portion 1, cylindrical in form, and provided on its smaller end with a contracted tube 2, adapted for attachment to the phonograph or like instrument. Said throat 1 is further provided on its large end with a circumferential outstanding flange 3. The horn further comprises a flaring bell mouth 4, provided on its inner end with an angularly extending circumferential flange 5 and provided on its inner surface with a series of open channels 6 and a series of closed sound recoiling pockets 7, said channels and said pockets being formed within said bell 4 radiating from its inner end proportionate to its flare, and arranged in alternating circular series.

The bell mouth 4 is preferably constructed from a blank 8, illustrated in Fig. 4, which in the forming of said bell, is bent until its edges 9 are drawn together and suitably secured. The bell 4 is further secured to form

a continuous structure with the throat 1 by means of a two-part sounding drum 10, in the form of an enlarged encircling ring, semi-circular in cross section, and attached to said throat 1 and said bell 4 by means of their respective flanges 3 and 5. The throat 1 and the bell 4 are further connected within the drum 10, on a plane with their inner surfaces, by means of a suitable screening 11, which coöperates with said drum 10 and the remainder of the structure in producing the desired amplification and added distinctness of sound.

Having thus fully described my invention I claim:

1. In a sound amplifying horn, the combination of the throat portion, adaptable for attachment to an instrument, a flaring bell mouth spacedly connected to said throat portion, an enlarged sounding drum spanning the space between said throat and bell, and sound recoiling devices arranged in said bell mouth, substantially as described.

2. In a sound amplifying horn, the combination with the throat portion, adapted for attachment to an instrument, a flaring bell mouth spacedly connected to said throat portion, an enlarged curved sounding drum spanning the space between said throat and said bell and sound recoiling pockets and sound channels alternately arranged upon the inner surface of said bell mouth, substantially as described.

3. In a sound amplifying horn, the combination of a gradually enlarging throat portion, adaptable for attachment at one end to an instrument, a flaring bell mouth spacedly connected to the other end of said throat portion, an enlarged circular sounding drum spanning the space between said throat and said bell, and a plurality of sound recoiling pockets and sound channels formed upon the inner surface of said bell mouth and radiating outwardly, substantially as described.

4. In a sound amplifying horn, the combination of a throat portion gradually increasing in diameter, and adaptable for attachment at its smaller end to an instrument, a flaring bell mouth spacedly connected to said

throat portion, an enlarged circular sounding
drum, curved in cross section, spanning the
space between said throat portion and said
bell mouth, a circular section of screening
5 connecting said throat and said bell within
said drum, and a plurality of sound recoiling
pockets and sound channels alternately ar-
ranged upon the inner surface of said bell

mouth and radiating outwardly, substan-
tially as described. 10

In testimony whereof I affix my signature
in presence of two witnesses.

JAMES F. WHEELER.

Witnesses:

F. W. DE WITT,

W. E. SPERCER.

No. 873,763.

PATENTED DEC. 17, 1907.

T. H. MACDONALD.
RECORDER AND REPRODUCER.
APPLICATION FILED APR. 8, 1907.

Fig. 1.

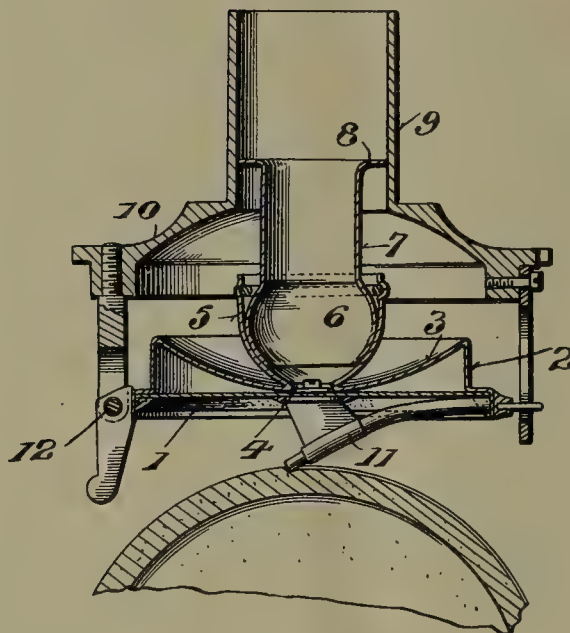
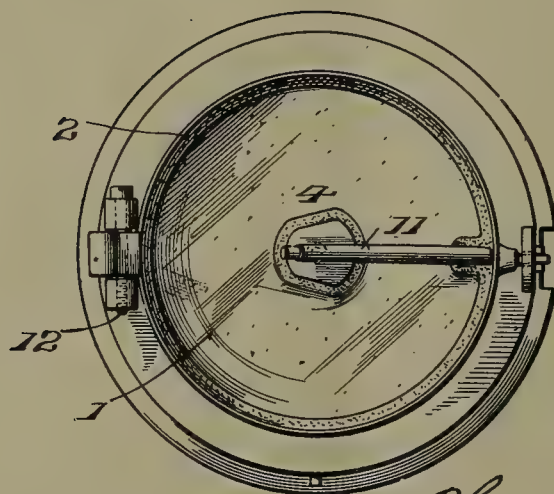


Fig. 2.



Inventor
Thos. H. Macdonald

Witnesses

Gustave K. Thompson
Ruth L. Fitzhugh.

By
Wm. Cameron Lewis
His Attorneys

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

RECORDER AND REPRODUCER.

No. 873,763.

Specification of Letters Patent.

Patented Dec. 17, 1907.

Application filed April 8, 1907. Serial No. 367,097.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, a resident of Bridgeport, Connecticut, have invented a new and useful Improvement in Recorders and Reproducers, which invention is fully set forth in the following specification.

This invention relates to recorders and reproducers for talking-machines and has for its object to improve the construction of the same, and more particularly the construction of the sound box with relation to the diaphragm, and the connection of the sound tube to the sound box. With this object in view the invention consists of a circular sound box whose walls support the diaphragm, the crown or top of the box being dished or concave with its center very close to the diaphragm and its periphery, where it joins the walls, many times farther removed from the diaphragm, so that at the outer edge the air space in the sound box is many times greater than in the center. This is accomplished by placing the dished crown of the sound box with its convex side towards the diaphragm and its concave side on the exterior of the box. The sound tube is connected to the concave side of the sound box crown by a ball and socket joint, the socket being preferably struck up integrally with the metal of the crown, and the ball of the joint being formed integral with the sound conveying tube.

Within limits the inventive idea may be embodied in a variety of structures, and for the purpose of illustration there is shown in the accompanying drawings a recorder which embodies the invention, in which drawings

Figure 1 is a transverse vertical section of a recorder with the recording style in place upon a record tablet; and Fig. 2 is a bottom plan view of the same.

Referring to the drawings, 1 is the diaphragm and 2 is the sound box supporting the same at its periphery in the usual or any suitable way. From the diaphragm the walls of the sound box rise to a considerable distance, as shown, and from said walls the crown or top 3 of the box is dished or concaved inwards so that at its center it is very close to the diaphragm, preferably about 1/100th of an inch therefrom. The crown is provided with a central opening 4, and rising from around this opening is a spherically formed socket 5 within which loosely rests

the spherically formed end 6 of the sound tube 7 which is provided with a flange 8 at its upper end, fitting closely but loosely within the neck 9 of the frame 10 to which the usual or any suitable sound conveying element, as a horn, may be attached.

It will be understood that the diaphragm carries a recording or reproducing style, here shown as a recording style 11, and that the sound box is pivoted at 12 to the frame 10. Preferably the entire sound box and the socket 5 are struck up from a single piece of sheet metal, while the ball 6 and the other portions of the sound tube are also struck up from a single piece of metal, forming a light, cheap and efficient structure.

What is claimed is:

1. In a recorder or reproducer, a sound box with a dished or concave crown and a diaphragm supported with its central portion in close proximity to the central portion of said crown and its periphery relatively far removed from said crown.

2. In a recorder or reproducer, a sound box having an inwardly dished crown, and a diaphragm supported by the side walls of said sound box with the central portion of the diaphragm in close proximity to the central portion of said crown and the periphery thereof relatively far removed from said crown.

3. In a recorder or reproducer, a sound box having side walls and an inwardly dished crown or top with an opening at or near its center, a sound tube joined to said crown or top around said opening, and a diaphragm supported by the side walls of said sound box with its central portion in close proximity to the inner side of said dished crown and its peripheral portion relatively far removed from said crown.

4. In a recorder or reproducer, a sound box having side walls and an inwardly dished crown or top with an opening at or near its center, a sound tube joined to said crown by a ball and socket joint surrounding said opening, and a diaphragm supported by the side walls of said sound box with its central portion in close proximity to the inner side of said dished crown at said opening and its peripheral portion relatively far removed from said crown.

5. In a recorder or reproducer, a sound box and a diaphragm supported by said sound box, the crown or top of the said box having a convex inner surface with an opening

through its central portion, the central portion of the crown being in close proximity to said diaphragm and retreating farther and farther from the diaphragm as it approaches
5 the side walls of the box.

6. In a recorder or reproducer, a sound box struck from a single piece of sheet metal and having side walls, an inwardly dished crown and a spherically formed socket which latter
10 surrounds a central opening in said crown, a diaphragm supported with its central portion in close proximity to the said central opening

and its peripheral portion relatively far removed from said crown, and a sound tube having a spherical portion fitting into said
15 socket.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

A. B. KEOUGH,
C. A. GIBNER.

No. 873,860.

PATENTED DEC. 17, 1907.

H. F. HOLMES.
PHONOGRAPH.

APPLICATION FILED JULY 7, 1905.

Fig. 1.

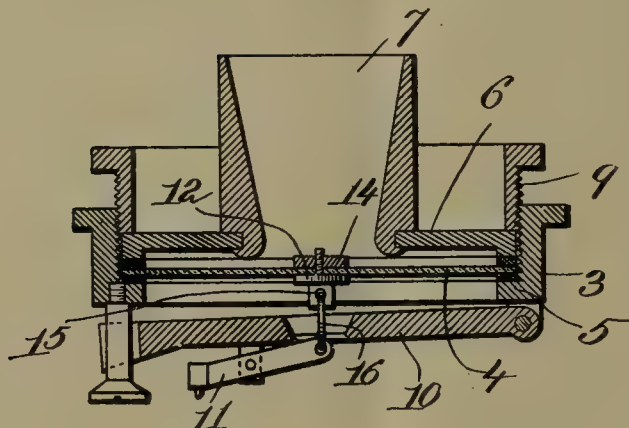
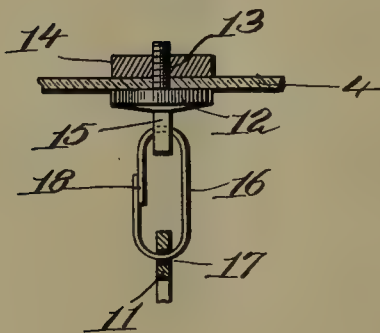


Fig. 2.



Witnesses:

W. C. Lumsford

Arthur W. Knapp

Inventor:

Horace F. Holmes.

By Charles Gregory, atty.

UNITED STATES PATENT OFFICE.

HORACE F. HOLMES, OF CONCORD, NEW HAMPSHIRE.

PHONOGRAPH.

No. 873,860.

Specification of Letters Patent.

Patented Dec. 17, 1907.

Application filed July 7, 1905. Serial No. 268,673.

To all whom it may concern:

Be it known that I, HORACE F. HOLMES, a citizen of the United States, residing at Concord, in the county of Merrimack and State of New Hampshire, have invented an Improvement in Phonographs, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawings representing like parts.

This invention relates to phonographs, and especially to the manner of connecting the diaphragm to the reproducer or recorder lever, the object of the invention being to provide a novel connection between these parts which results in increased smoothness and distinctness in the sound produced.

The novel features of my invention will be more fully hereinafter described and then pointed out in the claims.

Figure 1 is a central section through a reproducer embodying my invention; Fig. 2 is a section on an enlarged scale on the line $x-x$ Fig. 1.

3 designates the usual cylindrical frame of the reproducer which supports the diaphragm 4, said frame having the inturned flange 5 on which the diaphragm rests. The diaphragm is held in place by the mouth-piece supporting-plate 6 which carries the usual mouth-piece 7, said plate being retained in position by the usual screw-threaded sleeve 9.

10 designates the usual weighted clapper pivoted to the frame 3, and to which is pivoted the reproducer lever 11.

The parts thus far described are such as are usually found in reproducers and form no part of my present invention, which relates solely to the manner of connecting the reproducer lever to the diaphragm.

Instead of cementing a head or attaching member to the diaphragm, as is commonly done, I provide such a head or member 12 with a screw-threaded stem 13 which projects through the diaphragm 4, and on the upper end of which is secured a clamping-nut 14. This attaching-plate 12 has a perforated stem 15 depending therefrom to which is se-

cured a closed link 16, said link passing through an eye or aperture 17 in the end of the reproducer lever.

I have found from my experiments with a construction such as above described that where a closed link or loop 16 is used to connect the reproducer lever to the diaphragm instead of the open link or hook member commonly used, the sound produced has a much smoother quality and is more distinct.

I have found that by securing the attaching member 12 to the diaphragm, as herein shown, a better result is attained than when the head 11 is securely cemented to the underside of the diaphragm.

The closed link 16 may be made in a variety of ways, but preferably it is made by bending a wire into loop-shape and fastening the ends thereof together, as at 18. It is not essential to my invention that these ends should be fastened together, as if the proper material is used the ends will stay in contact with each other when the loop is bent to shape without any securing means, the important thing however is the closed loop as distinguished from an open loop.

Having described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In a phonograph, the combination with a frame, of a diaphragm within the frame, means to clamp the diaphragm at its periphery to the frame, a weighted clapper pivoted to the frame, a reproducer lever pivoted to the clapper, an attaching plate 12 on the under side of the diaphragm, said attaching plate having a screw-threaded stem extending through the diaphragm and a perforated stem 15, a nut on the screw-threaded stem for clamping the attaching plate to the diaphragm, and a closed loop 16 connecting the reproducer lever and the perforated stem 15, said loop being made from a single piece of wire bent to the proper shape and having its ends secured together.

2. In a phonograph, a diaphragm, means to support the same, a pivoted reproducing lever, an attaching member on the underside of the diaphragm, said attaching mem-

ber having a screw-threaded stem extending
through the diaphragm, a clamping-nut on
said stem above the diaphragm, and a closed
loop connecting said attaching member to
5 the reproducer-lever said loop being made
from a single piece of wire bent to the proper
shape and having its ends overlapping and
secured together.

In testimony whereof, I have signed my
name to this specification, in the presence of 10
two subscribing witnesses.

HORACE F. HOLMES.

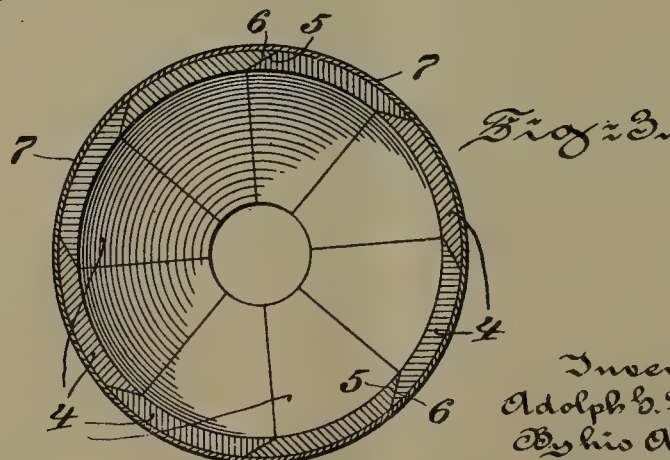
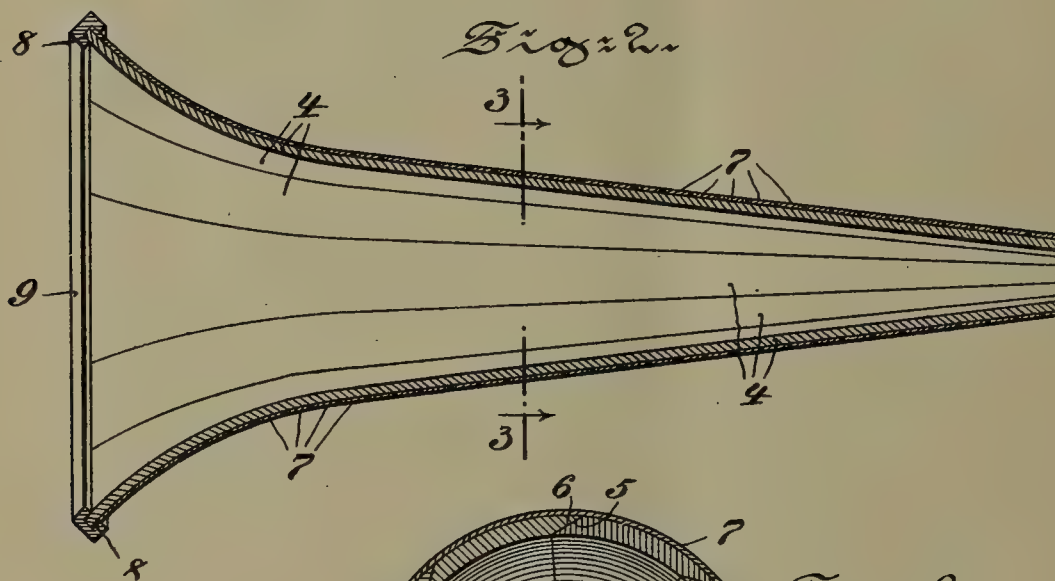
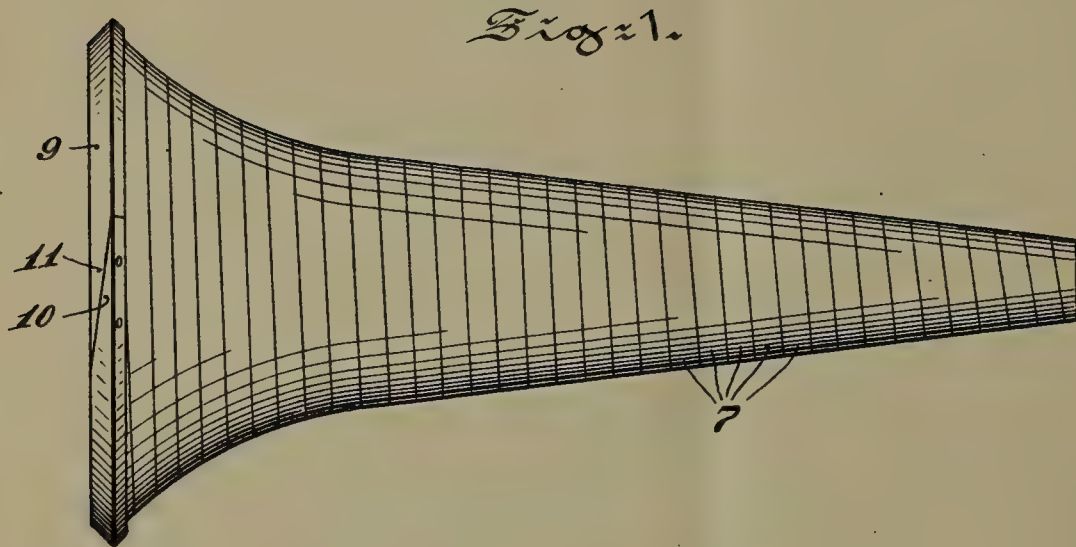
Witnesses:

SIDNEY S. UPHAM,
ALBERT H. DALRYMPLE.

No. 873,908.

PATENTED DEC. 17, 1907.

A. G. SOISTMANN.
HORN FOR TALKING MACHINES.
APPLICATION FILED MAY 5, 1906.



Witnesses:
Mae Hofmann
Howard S. Kie.

Inventor:
Adolph S. Soistmann
By his Attorney,
J. H. Edwards

UNITED STATES PATENT OFFICE.

ADOLPH G. SOISTMANN, OF PHILADELPHIA, PENNSYLVANIA.

HORN FOR TALKING-MACHINES.

No. 873,908.

Specification of Letters Patent.

Patented Dec. 17, 1907.

Application filed May 5, 1906. Serial No. 315,272.

To all whom it may concern:

Be it known that I, ADOLPH G. SOISTMANN, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Horn for Talking-Machines, of which the following is a specification.

My invention relates to improvements in horns for talking machines.

My object is to provide an improved structure combining simplicity of construction, strength, and lightness in weight, and tone qualities capable of producing a maximum resonance.

Referring to the drawings: Figure 1 is a side elevation of my horn. Fig. 2 is a longitudinal vertical section thereof, and Fig. 3 is a cross section on line 3, 3 of Fig. 2, on an enlarged scale.

Similar numerals refer to similar parts throughout the several views.

My improved horn comprises a series of non-metallic tapered sections 4, preferably of hard wood or fiber. These sections 4 are each beveled upon each longitudinal edge 5 and 6, as clearly shown in Fig. 3, so that one bevel of each section may be termed an upper bevel, and the other an under bevel. These bevels are so disposed that the abutting edges of adjacent sections will overlap. These overlapping edges may be glued or otherwise fastened together to form a continuous horn shaped structure. Upon this structure, I then wrap a very thin narrow strip or ribbon 7 of wood or other suitable material and glue the same securely to said structure. I have found for example that a ribbon of veneering of approximately one quarter of an inch in width, and about one twentieth of an inch in thickness makes a satisfactory wrapping. This wrapping extends spirally from one end of a horn to the other. When the structure is so formed and wrapped, the

flaring end thereof is secured in the annular channel, 8 of the rim or ring 9. This ring or rim 9 has its ends provided with long bevels 10 and 11, adapted to overlap each other, so that, when the flaring end of the horn structure is seated in the channel 8, the ring is slightly contracted, the beveled edges 10 and 11 sliding slightly over each other, so that the rim 9 will form a tight locking engagement with the flaring end of the body of the horn structure.

By the construction above described, there is formed, at minimum expense, a structure having its component parts so intimate and secure, and locked together, as to constitute a substantially integral whole of great strength, extremely light in weight, and having qualities of resonance which render it an extremely powerful and efficient horn for the purpose specified.

What I claim is:—

1. A horn composed of longitudinally extending tapered sections forming a structure contracted at one end and flaring at the other, and a thin band spirally wound about said structure.

2. A horn composed of longitudinally extending tapered sections, forming a structure contracted at one end and flaring at the other, a thin band spirally wound about said structure, and a ring member provided with an annular channel to receive the flaring end of said structure.

3. A horn composed of longitudinally extending tapered sections, forming a structure contracted at one end and flaring at the other, and a reinforcing band surrounding the body of the horn intermediate its two ends.

ADOLPH G. SOISTMANN.

Witnesses:

MAE HOFMANN,
HOWARD S. OKIE.



L. T. HAILE.
SOUND REPRODUCING MACHINE.
APPLICATION FILED MAY 27, 1907.

2 SHEETS—SHEET 2.

Fig. 7.

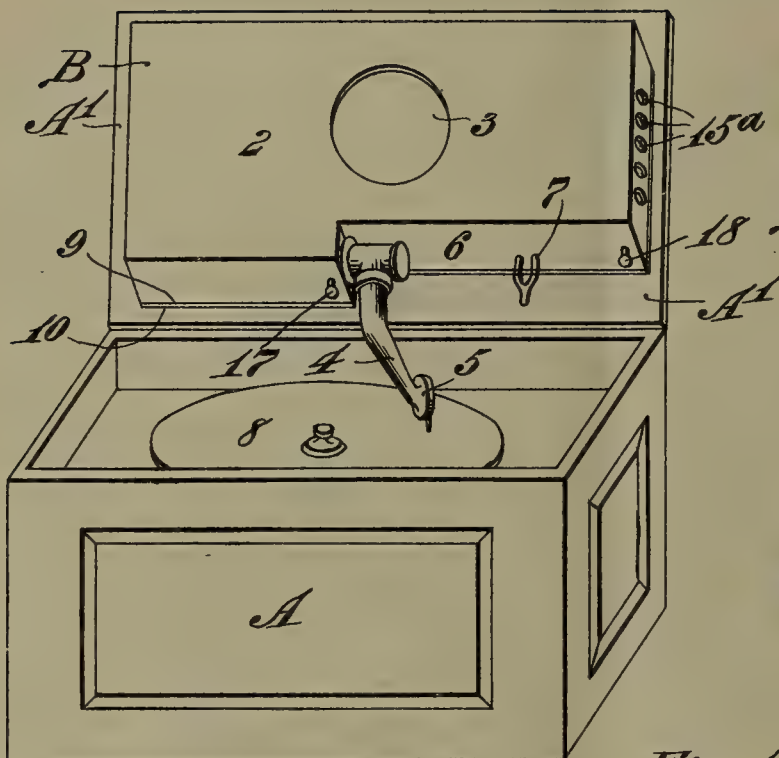


Fig. 9.

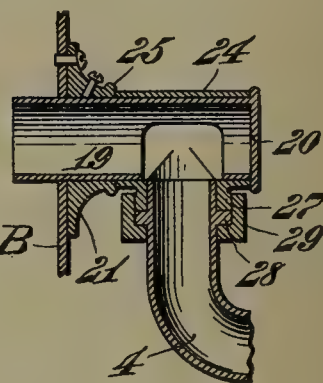


Fig. 10.

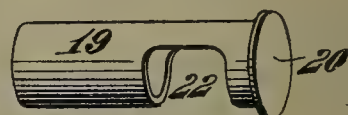


Fig. 8.

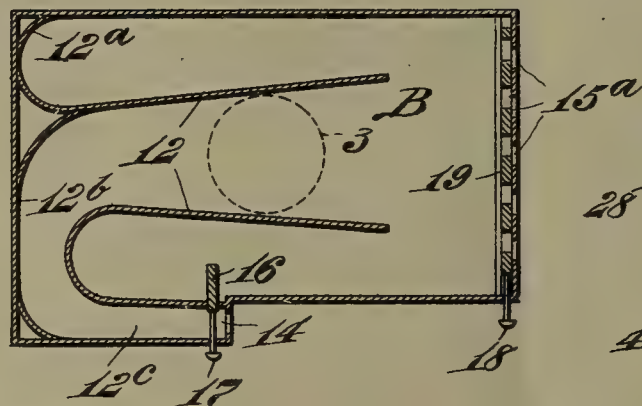


Fig. 11.



Fig. 12.

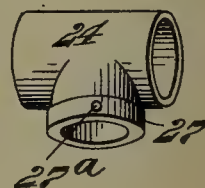
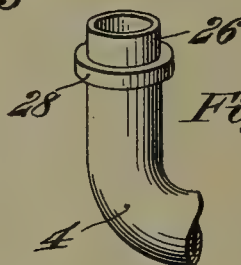


Fig. 13.



WITNESSES:

Jas. C. Wolnsmith
Q. M. Biddle

INVENTOR

Luther J. Haile
BY
H. J. Henton
ATTORNEY.

UNITED STATES PATENT OFFICE.

LUTHER T. HAILE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF NINE ONE-HUNDREDTHS TO JOSEPH W. SHANNON, ONE-TENTH TO FREDERICK J. GEIGER, AND ONE-TENTH TO LOGAN W. MULFORD, ALL OF PHILADELPHIA, PENNSYLVANIA.

SOUND-REPRODUCING MACHINE.

No. 873,937.

Specification of Letters Patent.

Patented Dec. 17, 1907.

Application filed May 27, 1907. Serial No. 375,766.

To all whom it may concern:

Be it known that I, LUTHER T. HAILE, a citizen of the United States, residing in the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to sound-reproducing machines for the reproduction of vocal and instrumental sound-waves from a "record" thereof, and has for its object to so amplify and modify the sound-waves so produced as to restore, in large part if not wholly, their original tone and timbre, closely simulating the original sounds recorded; and, as incidental advantages the elimination of the amplifying and discharging horn and its adjunctive parts, commonly employed with talking machines, and the metallic resonance resulting therefrom.

To these ends my invention consists of a new instrument comprising the combination, in or on a containing cabinet, with an interiorly-disposed sound-reproducing machine, of any known type in which sound-waves are recorded on a disk or cylinder record and sought to be reproduced therefrom by a diaphragm vibrated by a relatively traversing stylus and record, of a contiguously-mounted resonance-chamber, at least one wall of which is a sounding-board, into the interior of which chamber the sound-waves produced by the diaphragm of the reproducer are discharged; and means such as a pivotally-mounted hollow sound-conveying arm on the free end of which the sound-reproducer of the talking machine is mounted, the other and pivotally supported end of said arm being mounted in an apertured wall of said resonance-chamber in such manner as to discharge the sound-waves thereinto. Also in deflecting partition walls in the resonance-chamber, operating primarily as an amplifying conduit for the sound-waves on their passage through the resonance-chamber and during their impingement against the inner face of the sounding-board, and secondarily to modify their tone by contact of such partition walls with the resonant fibers of the sounding-board. Also in the provision of

valve mechanism governing the inlet to the resonance-chamber, as also valve mechanism governing its discharge ports, whereby the tone production may be regulated, namely, producing either loud or soft tones, with diminuendo or crescendo, at the will of the operator and while the machine is in operation. Also in other detail features of construction and arrangement of the elements relatively to the cabinet, in each of the two alternate forms thereof hereinafter described; the combined elements being well adapted to be contained in a cabinet and constitute a compact, self-contained and readily transportable machine or instrument.

The basic principle of the invention is exemplified in a device wherein sound-waves are reproduced from a "record" thereof by a contacting stylus vibrating a diaphragm and discharging the sound-waves so produced into the interior of a resonance-chamber of the character recited, whereby they operate to sympathetically vibrate the sounding-board wall or walls thereof; while a further basic principle is the deflection modification and amplification of such sound-waves within the resonance-chamber, exemplified by the provision of outwardly-diverging partition walls interiorly disposed between the sounding-board wall or walls of such resonance-chamber.

In the accompanying drawings illustrating my invention in two of its best forms: Figure 1 is a vertical section, partly in elevation, wherein the interior of the cabinet is reached through a hinged closure in one of its side walls, and wherein the resonance-box is placed over the open top of the cabinet, the back of the former constituting the top of the latter and not necessarily having any function as a sounding-board. Fig. 2 is a section of the resonance-box, drawn on the line 2—2 of Fig. 1. Fig. 3 is an elevation of the pivoted sound-conveying arm constructed to operate with the form of device shown in Fig. 1. Figs. 4, 5 and 6 are elevations in perspective of the elements comprising the sound-conveying arm of Fig. 3. Fig. 7 is an elevation in perspective of another form of the device, wherein the top of the cabinet is provided with a hinged lid or door and the resonance-box mounted on the inner face of the door, in such manner that both the top and back

sides of the resonance-chamber may operate as sounding-boards; and Fig. 8 is a horizontal sectional view thereof, through the center of the resonance-chamber. Fig. 9 is an elevation of a form of the pivotally-mounted sound-conveying arm constructed to operate with the form of device shown in Fig. 7; and Figs. 10 to 13 inclusive are elevations in perspective of the elements comprising the sound-conveying arm of Fig. 9.

Referring now to said drawings A indicates an inclosing cabinet, with an outwardly opening door A' in its side wall, in the form shown in Fig. 1, but with the door A' forming the top covering or lid, in the form shown in Fig. 7; the cabinet, in either case, containing a sound-reproducing or "talking-machine" of any usual type, the drawings showing the gramophone type, indicated in Figs. 1 and 7 wherein a motor-containing box is indicated at *m*, the turn-table at 10, the "record" at 8, and the sound-box mechanism, comprising a diaphragm and a stylus, at 5.

Sound waves produced by the diaphragm of the sound-box 5 are discharged through the sound-conveying tube 4, which is a tapering tube proceeding directly, and by its smaller end, from the back of the sound-box 5 to the aperture 14 in the base wall (Fig. 1) or of the adjacent side wall (Fig. 7) of the resonance-box B; and it is essentially a pivotally-mounted hollow arm to permit of the usual and required movement of the sound-box in its radial traverse over the "record".

If the hollow arm 4 is constructed with the usual joint, indicated by dotted lines at *n* in Fig. 1, then the arm 4 need have but a swinging movement in a horizontal plane, otherwise it must have also a limited movement vertically in a short arc of a circle. Means to permit it to have both motions are shown in the drawings, Figs. 3 to 6 inclusive, in which Figs. 4, 5 and 6 show the elements and Fig. 3 the same when assembled; and they are as follows:—A bracket-bearing ring 30, with ears 31 to attach it to the superposed box, is provided interiorly with a narrow ledge 36 and a curved annular wall 37. The upper end of the hollow arm 4 is provided with an enlarged head, shown in Fig. 5, having a curved exterior 34 adapted to register with the curved wall 37 of the ring, and between the two is interposed the ring 32 (Fig. 6); while to limit the vertical arc movement of the member 34 in the member 37, the former is provided with two oppositely-disposed pins 35 entering holes 33 in the ring member 32, which latter rests on the ledge 37 of the member 30 and fills the space above it and is held firmly in place when the parts are assembled and secured to the base-wall of the resonance-box B, as shown in Fig. 3. A somewhat different form of means providing for these movements of the sound-conveying arm 4 is required by reason of the mounting

of the resonance-box B on the inner face of the lid of the cabinet, as shown in Fig. 7, and these modified means are shown in Fig. 9, wherein the elements of the pivotal bearing are shown assembled. These elements are: an annular flange 28 slightly below the upper end 26 of the hollow arm 4. Upon said flange rests the lower end 27 of a three-way coupling 24. A retaining ring 29 holds the coupling 24 in place on the flange of the arm 4, being secured by screws 29^a entering holes 27^a. A cylindrical hollow member 19 provided with a flanged head-end 20 and a peripheral slot 22 is arranged sleeve-like within the coupling union 24, the flanged head 20 abutting and closing one end of the coupling, while the other end of the coupling member 24 abuts against the bead 25 on the bracket 21 which is screwed to the wall of the resonance-box B. The device has practically a universal joint, and is so designed to enable the arm 4 to have the requisite movements before described with reference to the pivotal bearing shown in Fig. 3, when the machine is in operation; but also, when it is desired to throw the machine out of action and close down the lid of the cabinet, the arm can then be swung upwards at a right angle to the face of the resonance-box and then downward, in a line therewith, resting in the recess 6 provided therefor and held supported therein by a hook 7 or other similar means.

The remaining and chief element of the new device, consisting of the resonance-box B and its adjunctive parts, I will now describe. In essentials it must provide a hollow chamber, preferably rectangular in planular outline and otherwise resembling the resonance-box of a guitar or violin, and have at least one of its sides operating as a sounding-board. It must have one or more sound-discharge openings. And it should have vertical partition walls, which are relatively diverging walls. Such a box is shown in Fig. 1 in which the top 2 of the resonance-box is a true sounding-board, shown with a central sound-discharge opening 3. Other sound-discharge openings may be provided therein, and a series of openings 15^a in one of the side walls, governed by an apertured sliding valve 19 actuated by a handle 18, may be provided. In said form shown in Fig. 1, the base 9 of the resonance-box is shown as the top of the cabinet, and is not necessarily another sounding-board for obvious reasons. In the form shown in Fig. 7, however, the base 9 of the resonance-box B is a true sounding-board, for it is insulated, so to speak, from the inner face of the cabinet lid by a narrow strip 10 interposed between the four edges of the base 9 and the cabinet lid. In both forms of resonance-box B there is provided an inlet port indicated at 14. In both the sound-waves impinge, so to speak, against the top sounding-board 2, at a direct

right angle in Fig. 1, and substantially so in Fig. 7, the sounding-board being thus set in sympathetic vibration.

Entrance of sound-waves to the resonance-chamber is governed by a valve 16 actuated by a lever-handle 17, and the partial opening or closing of this port has the effect to control the degree of loudness or softness of tone and produces a perfect diminuendo or crescendo at the will of the operator and while the machine is in operation if desired to so operate it.

An important, indeed an essential feature, in the construction of the resonance-chamber to produce the complete effect desired is in the provision of the interior partition walls. Referring first to Fig. 1 as the simpler form, the pair of partition walls 12, 12, are united in a curve at 12^b which is located adjacent to and inclosing the aperture 14, proceeding thence on gradually diverging lines which pass on either side of the aperture 3 in the sounding-board 2. Other curved walls 12^a are provided as shown in Fig. 1, as it is believed that such corners in the resonance-chamber should be eliminated; at least my experience with the machine so constructed has been more satisfactory. Such a partition is provided at 12^a in the form shown in Fig. 7, but in that form of resonance-box, the sound-waves from the diaphragm enter the sound-chamber through an aperture 14 cut in one of its side walls, hence the partition walls 12, 12, are curved to form the sound-passage 12^c leading directly to the aperture 14 which is governed by a valve 16 as in the other form of machine.

It is to be understood that my invention is not limited to the employment of either particular external form of resonance box shown, nor to either particular form of pivotal mounting of the hollow sound-conveying arm, nor to the employment in the cabinet, of a sound-reproducing machine of a gramophone type, employing a "disk" record; but on the contrary, a sound-reproducing machine of the phonograph or any other type, may be substituted, care being taken to supply the appropriate form of pivotal bearing for the sound-conveying arm to adapt it to any particular form or type thereof selected.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. A machine for reproducing sounds from a record thereof and modifying their tone and timbre, comprising an inclosing cabinet and the following interiorly contained instrumentalities in operative combination, namely, mechanism for reproducing sound-waves from a sound-record, a resonance-box one wall of which is a sounding-board adapted to be vibrated sympathetically by said

sound-waves, and forming a resonance-chamber which is substantially closed other than by sound-discharge openings, with connecting tubular means operatively mounted to convey said sound-waves from the reproducer to the interior of said resonance-chamber.

2. A machine of the character recited, comprising a containing cabinet, and the following interiorly-contained elements in operative combination, namely: mechanism for reproducing sound-waves from a record thereof, a contiguous resonance-chamber formed by a box one exterior wall of which is a sounding-board, the interior of said box containing outwardly-diverging partition walls operating primarily to form an amplifying passage for said sound-waves and secondarily to modify the tone thereof; with means for conducting the sound-waves from the sound-reproducing mechanism to said amplifying passage in the resonance-chamber.

3. A machine of the character recited comprising the following instrumentalities, in operative combination, namely a cabinet with interiorly-contained mechanism for reproducing sound-waves from a sound-record, a contiguously mounted box providing a resonance-chamber the exterior wall of which is a sounding-board, a pivotally-mounted hollow sound-conveying arm leading to an aperture in an oppositely-disposed wall of said box by which it is mounted in the cabinet, said arm operating to convey sound-waves from the sound-reproducer to the interior of the resonance-chamber, with valvular means governing the delivery thereof to said chamber.

4. A machine of the character recited comprising the following instrumentalities, in operative combination, namely a machine for mechanically reproducing vibratory sound waves from a sound-record, a box providing a resonance-chamber one wall of which is a sounding-board, and having interior diverging partition walls, with a pivotally-mounted hollow sound-conveying arm leading said vibratory sound-waves to the diverging passageway within the resonance-chamber.

5. A machine of the character recited comprising the following instrumentalities, in operative combination, namely a machine for mechanically reproducing vibratory sound-waves from a sound-record, a box providing a resonance-chamber to which said sound-waves are delivered and having a pair of oppositely-disposed sounding-boards and interior diverging partition walls, with a pivotally-mounted hollow sound-conveying arm leading said vibratory sound-waves to the diverging passageway within the resonance-chamber.

6. A machine of the character recited comprising a containing casing, and within it a

machine for mechanically reproducing vibratory sound-waves from a sound-record, a superposed resonance-box mounted on and forming the top of said casing, said box comprising top and bottom connected walls, the former of which is a sounding-board, and the latter of which forms the top of said casing, with a pivotally-mounted hollow sound-conveying arm leading the sound-waves from the sound-reproducer and discharging them through an aperture in the contiguous wall of said resonance-box.

7. In a machine of the character recited comprising a cabinet with interiorly-contained mechanism for reproducing sound-waves from a sound-record, the combination therewith of superposed means operating as well to amplify the tone and modify the timbre of the sound-waves so produced, said means consisting essentially of a resonance-chamber having its upper and exterior inclosing wall adapted to operate as a sounding-board, and containing interiorly a pair of outwardly diverging partition walls constituting a sound-amplifying passage, with a vertically-disposed sound-conveying arm pivotally mounted against an aperture in the lower and contiguous wall of said box, operating to convey the sound-waves from the reproducer to said amplifying passage within the resonance-chamber and against the sounding-board wall thereof.

8. In a machine of the character recited, an inclosing cabinet, with a chamber containing mechanism for reproducing sound-waves from a record thereof, a superposed resonance-box formed by a pair of oppositely-disposed sides, the upper one of which is a sounding-board, with connecting upright side-walls one of which is apertured to provide sound-discharge openings, with valvular means governing the same, a hollow tapering sound-conveying arm leading from the sound-reproducing mechanism and pivotally mounted at its end of largest diameter, against an inlet aperture in the basal wall of said resonance-box, with valvular means

governing the entrance of such sound-waves therein.

9. A machine of the character recited comprising an inclosing cabinet with a hinged lid, interiorly-contained mechanism for reproducing sound-waves from a sound-record, a resonance-box mounted on the inner face of said lid and consisting of a pair of oppositely-disposed sounding-boards with connecting side walls, the exterior sounding-board having a sound-discharge opening and the other being secured to the face of the hinged lid, with an edge strip of material interposed between them; a tapering hollow sound-conveying arm leading the sound-waves from the reproducer and discharging them through an aperture in one of the connecting side walls of said resonance-box, said arm having pivotal bearings permitting both vertical and lateral movements thereof relatively to the resonance-box on which it is mounted.

10. A machine of the character recited comprising an inclosing cabinet having a hinged lid, and interiorly contained means for mechanically reproducing sound-waves from a sound-record, the combination therewith of a hollow sound-conveying arm with pivotal bearings permitting both vertical and lateral movements thereof at its discharge end, and a superposed box mounted on the inner face of said hinged lid and constituting a resonance-chamber, with sound-discharging apertures, and having interior diverging partition walls; said box comprising two oppositely-disposed flat sides, one of which is a sounding-board, with connecting side-walls one of which is apertured to operatively support the delivery end of said sound-conveying arm.

In testimony whereof, I have hereunto affixed my signature this 23rd day of May A. D. 1907.

LUTHER T. HAILE.

Witnesses:

A. M. BIDDLE,
C. A. DUNLAP.

No. 873,969.

PATENTED DEC. 17, 1907.

C. THOMA, JR. & W. THOMA.
PHONOGRAPH.

APPLICATION FILED MAY 16, 1907.

2 SHEETS—SHEET 1.

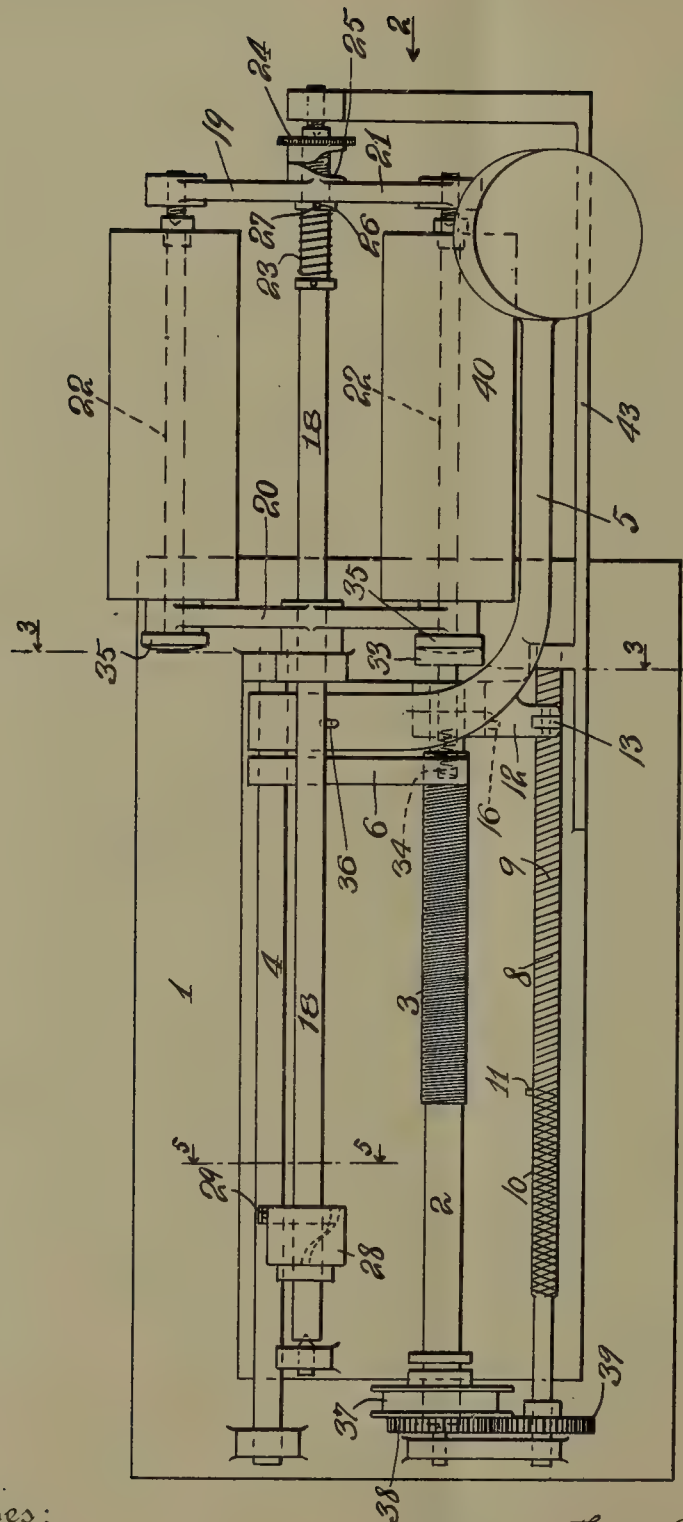
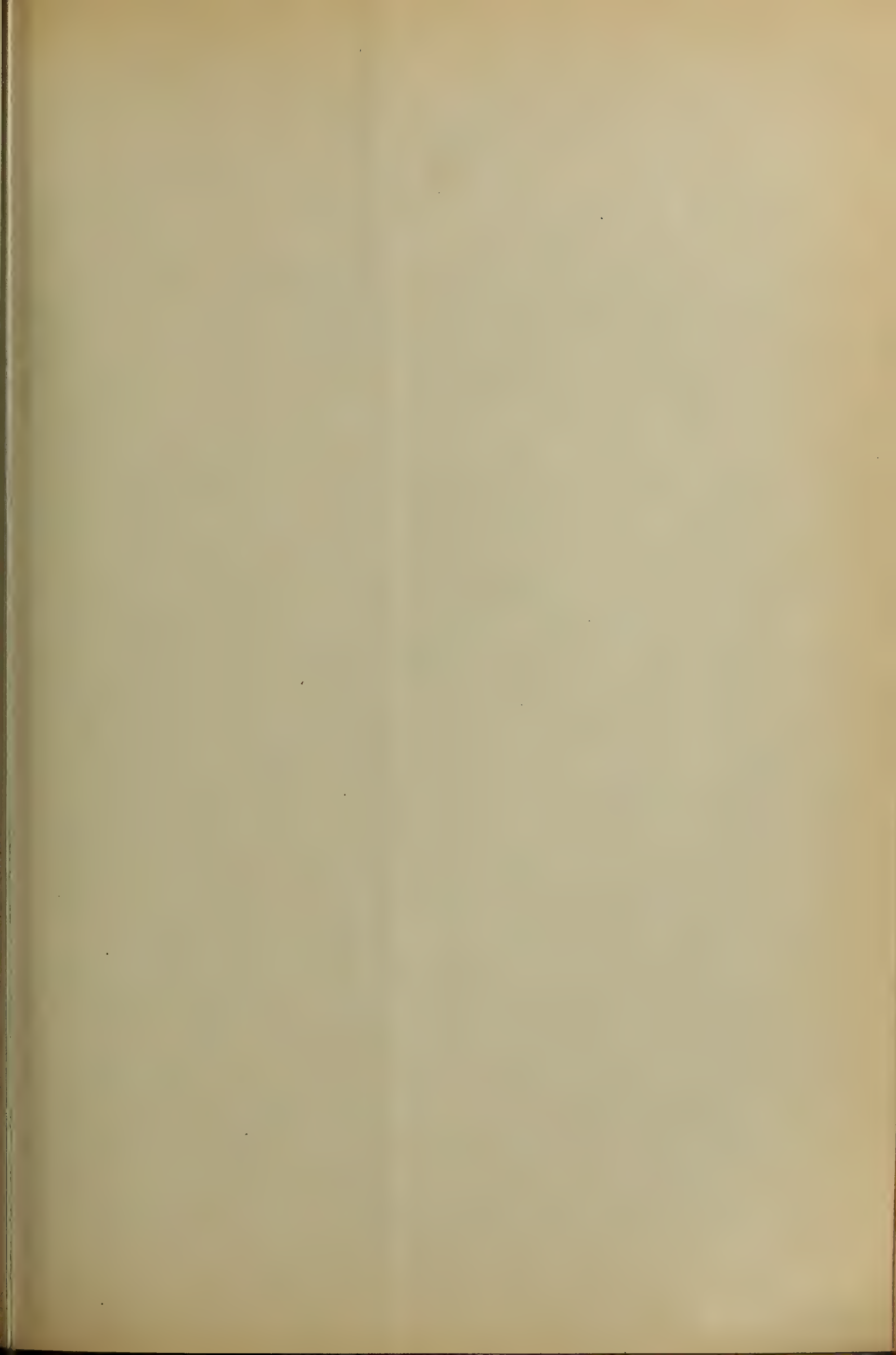


FIG. 1

Witnesses:
A. L. Stillman
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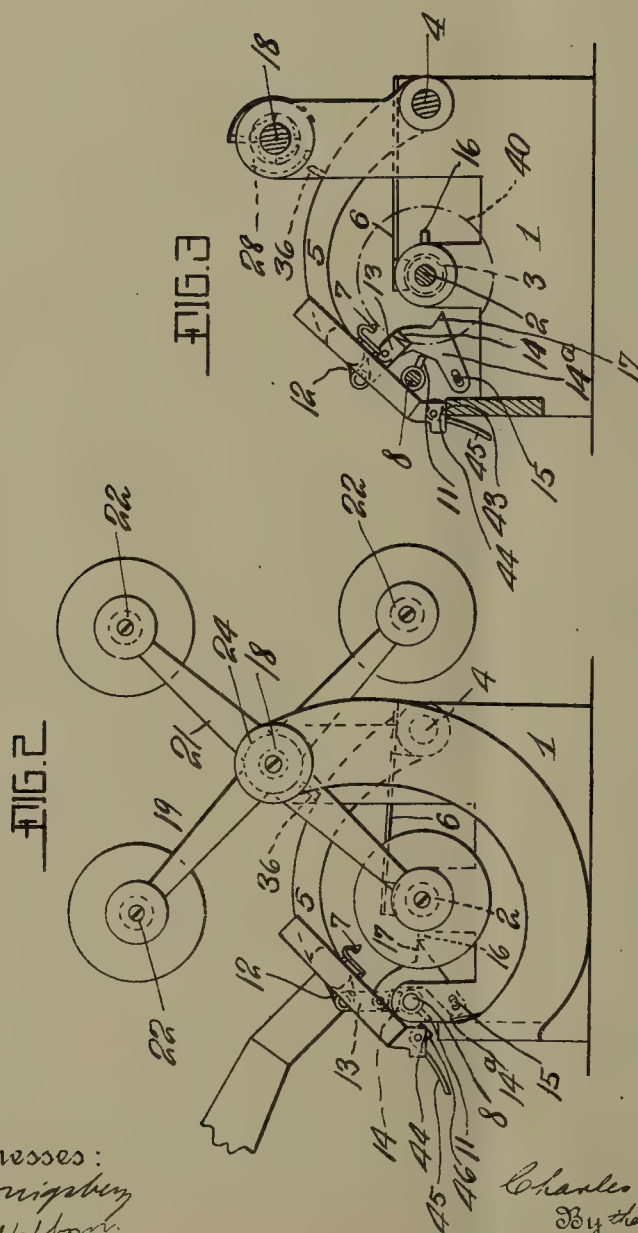
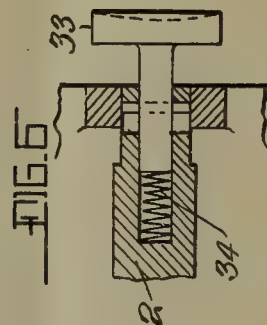
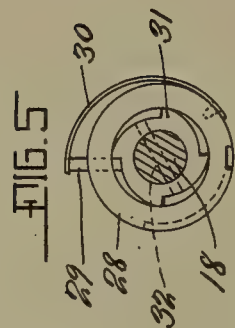
Inventors
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C. THOMA, JR. & W. THOMA.
PHONOGRAPH.

APPLICATION FILED MAY 16, 1907.

2 SHEETS—SHEET 2.



Witnesses:
W. H. H. H. H.
R. L. H. H.

Inventors
Charles Thoma Jr. and Walter Thoma
By their Attorney
W. H. H. H.

UNITED STATES PATENT OFFICE.

CHARLES THOMA, JR., AND WALTER THOMA, OF CARLSTADT, NEW JERSEY.

PHONOGRAPH.

No. 873,969.

Specification of Letters Patent.

Patented Dec. 17, 1907.

Application filed May 16, 1907. Serial No. 373,969.

To all whom it may concern:

Be it known that we, CHARLES THOMA, Jr., and WALTER THOMA, citizens of the United States of America, and residents of Carlstadt, Bergen county, and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

The present invention relates to phonographs or other sound reproducing machines, and has more particularly reference to a multi-record or a repeater phonograph.

In machines of this character, the record, or the sound reproducing mechanism, is given a reciprocating motion, one with relation to the other. One motor being utilized to effect the forward feed or outward excursion during the sound reproducing period, and another motor, generally a spring or a weight, is utilized to return the parts to their original position at a greater speed than that attained during the outward excursion.

The chief object of the present invention is to produce a multi-record machine operating automatically, and the invention consists of the hereinafter described features of construction as pointed out in the claims.

In the accompanying drawings the invention is embodied in a concrete and preferred form, but changes of construction may be made without departing from the legitimate and intended scope of the invention.

In the said drawings:—Figure 1 is a plan view of a phonograph embodying the invention. Fig. 2 is an end elevation looking in the direction of the arrow 2 in Fig. 1, showing the stylus disengaged from the record. Fig. 3 is a vertical sectional view on the line 3—3 of Fig. 1 showing the stylus in engagement with the record. Fig. 4 is a detail view of the double reversely threaded repeater screw. Fig. 5 is a vertical sectional view on the line 5—5 in Fig. 1. Fig. 6 is a sectional detail view of part of the feed screw.

Similar characters of reference indicate corresponding parts in the different views.

1 indicates a frame work of any suitable construction for properly supporting the parts composing the machine.

2 indicates the main drive shaft carrying the feed screw 3. Pivotally supported on the shaft 4 and adapted to slide thereon is a sound reproducing mechanism 5 connected to the thread follower 6 adapted to engage

with the feed screw during the sound reproducing period and having the stylus 7 adapted to engage with the record.

8 indicates the repeater screw whose threads are coarser than those of the feed screw. This repeater screw is provided with one thread 9 extending substantially throughout its entire length and with a reverse thread 10 extending only a short distance of its length and provided with a trip 11. Mounted on the bracket 12 of the sound reproducing mechanism is a link 13 provided with the boat-shaped thread follower 14 adapted to engage in the threads of the double reverse threaded repeater screw 8. Pivotally connected to the link 13 is an arm 14^a which has another pivotal support on the rod 15 located underneath the repeater screw and on which the said arm is adapted to slide. Mounted on the drive shaft 2 is a trip 16 which is adapted to engage with the nose 17 of the arm 14^a when brought into the plane thereof.

18 denotes a shaft on which is mounted the record carrier 19. This record carrier is composed of two hub sections 20 and 21, one of which is fixed and is provided with a plurality of spindles 22 for supporting records. The other hub section 21 normally tends to be forced out of engagement with the spindles 22 by reason of the spring 23 but is confined and held in contact with the said spindles by reason of the cam nut 24 engaging with the cam surface 25 on the hub section. By turning the cam nut 24 the spring 23 will be allowed to press the hub section 21 out of engagement with the spindles 22, and by turning the arms of the said hub section to a point where they will be in between the records, the latter can be removed from the spindles and replaced by others.

26 indicates a slot in the hub section 21 adapted to receive the pin 27 on the shaft 18 so as to insure the hub section 21 being returned to its proper position circumferentially when it is tightened up against the spindles 22. Loosely mounted on the shaft 18 is a cam collar 28 having the pawl 29 held in position by the spring 30 and adapted to engage with the teeth of the ratchet 31 when turned in one direction and to move idly over the teeth when turned in the other direction. The ratchet 31 is fixed on the shaft 18 by means of the pin 32.

36 is a pin carried by the sound reproduc-

ing mechanism adapted to engage with the cam collar 28.

On the end of the drive shaft 2 is a friction disk 33 held yieldingly in position by means of a spring 34. One end of each of the spindles 22 is provided with a complementary friction disk 35 adapted to engage with the feed screw 33 when brought into alinement therewith, the spring 34 allowing the two disks to slip into engagement with each other.

Motion is imparted to the device by means of a suitable motor from which power is transmitted to the pulley 37 on the drive shaft 2, and for the purpose of this disclosure the said pulley 37 may be considered the motor. 38 indicates a gear mounted on the end of the shaft 2 and intermeshing with the gear 39 on the end of the repeater screw.

The operation is as follows:—Assume that the sound reproducing mechanism is traveling in a forward direction during the sound reproducing period and that the thread follower is in engagement with the feed screw 3 and the stylus 7 in engagement with the record 40. As the sound reproducing mechanism reaches the limit of its movement in a forward direction the nose 17 on the arm 14^a will be brought into the plane of the trip 16 on the feed screw shaft. This will cause the link 13 to be swung around its pivot on the sound reproducing mechanism whereby the boat shaped follower 14 will be brought into engagement with the thread 9 of the repeater screw, at the same time causing the said reproducing mechanism to be turned on the shaft 4 and lifting the thread follower 6 out of engagement with the feed screw 3 and the stylus 7 out of engagement with the record. By this means the sound reproducing mechanism will be moved back to its initial position, but at a greater speed than the speed of its outward excursion. When the follower 14 reaches the extreme end of the thread 9 it will come into contact with the surface 41 causing the said follower to be turned around its swivel point 42 and to engage in the thread 10 of the repeater screw. By this means the motion is reversed and the sound reproducing mechanism is moved forward again but at a greater speed than the speed attained during the sound reproducing period. This forward motion will continue until the follower 14 encounters the trip 11 which will cause the link 13 to swing around its pivot on the sound reproducing mechanism thereby disengaging the follower from the shaft 8 and allowing the said reproducing mechanism to descend and the thread follower 6 to be brought into contact with the feed screw 3 and the stylus into engagement with the record. In this way the same record may be repeated several times. If, however, the pin 36 is in position on the sound reproducing mechanism it will during the re-

turn movement of the said sound reproducing mechanism, enter the groove of the cam collar 28, thereby causing the pawl 29 to engage with the ratchet 31 and thus turn the shaft 18 automatically a sufficient distance to bring another record into engagement with the end of the shaft 2. The forward movement of the sound reproducing mechanism will cause the pin 36 to travel in the cam groove of the collar 28 thereby turning it back again so as to reposition it for the next return movement, without however, turning the shaft 18.

43 denotes a guideway on the framework adapted to support the projection 44 of the sound reproducing mechanism when the stylus is in engagement with the record, so as to relieve the latter of the weight of the said reproducing mechanism.

45 is a lever having the cam surface 46 whereby the stylus can be raised out of engagement with the record at will.

What is claimed is:—

1. In a phonograph, the combination of a record, a sound reproducing mechanism, and driving means for causing one of the said members to be reciprocated with relation to the other, comprising: a feed screw, a thread follower adapted to engage with the feed screw during the sound reproducing period, a double reversely threaded repeater screw, a second thread follower adapted to engage with the repeater screw, means for causing the first thread follower to disengage with the feed screw at the end of the sound reproducing period and the second thread follower to engage with one of the threads of the repeater screw thereby returning the parts to their original position, means for causing the second thread follower to engage with the other thread of the repeater screw at the end of the return movement so as to advance the parts prior to the sound reproducing period, and means for causing the second thread follower to disengage with the repeater screw and the first thread follower to engage with the feed screw at the beginning of the sound reproducing period.

2. In a phonograph, the combination of a record, a transversely movable sound reproducing mechanism, a feed screw, a thread follower, carried by the sound reproducing mechanism, a feed screw, a thread follower, carried by the sound reproducing mechanism, adapted to engage with the feed screw during the sound reproducing period a double reversely threaded repeater screw, a second thread follower, carried by the sound reproducing mechanism, adapted to engage with the repeater screw, means for causing the first thread follower to disengage with the feed screw at the end of the sound reproducing period and the second thread follower to engage with one of the threads of the repeater screw thereby returning the sound

reproducing mechanism to its original position, means for causing the second thread follower to engage with the other thread of the repeater screw at the end of the return movement so as to advance the sound reproducing mechanism prior to the sound reproducing period, and means for causing the second thread follower to disengage with the repeater screw and the first thread follower to engage with the feed screw at the beginning of the sound reproducing period.

3. In a phonograph, the combination of a record, a sound reproducing mechanism, and driving means for causing one of the said members to reciprocate with relation to the other, comprising: a feed screw, a thread follower adapted to engage with the feed screw during the sound reproducing period, a double reversely threaded repeater screw whose threads are coarser than the threads of the feed screw, a second thread follower adapted to engage with the repeater screw, means for causing the first thread follower to disengage with the feed screw at the end of the sound reproducing period and the second thread follower to engage with one of the threads of the repeater screw thereby returning the parts to their original position at a greater speed than their speed during the sound reproducing period, means for causing the second thread follower to engage with the other thread of the repeater screw at the end of the return movement so as to advance the parts prior to the sound reproducing period at a speed greater than their speed during the sound reproducing period, and means for causing the second thread follower to disengage with the repeater screw and the first thread follower to engage with the feed screw at the beginning of the sound reproducing period.

4. In a phonograph, the combination of a record, a transversely movable sound reproducing mechanism, a feed screw, a thread follower carried by the sound reproducing mechanism, adapted to engage with the feed screw during the sound reproducing period, a double reversely threaded repeater screw whose threads are coarser than the threads of the feed screw, a second thread follower, carried by the sound reproducing mechanism, adapted to engage with the repeater screw, means for causing the first thread follower to disengage with the feed screw at the end of the sound reproducing period and the second thread follower to engage with one of the threads of the repeater screw thereby returning the sound reproducing mechanism to its original position at a greater speed than its speed during the sound reproducing period, means for causing the thread follower to engage with the other thread of the repeater screw at the end of the return movement so as to advance the sound reproducing mechanism at a speed greater

than its speed during the sound reproducing period, and means for causing the second thread follower to disengage with the repeater screw and the first thread follower to engage with the feed screw at the beginning of the sound reproducing period.

5. In a phonograph, the combination of a record, a transversely movable sound reproducing mechanism pivotally supported, a feed screw, a repeater screw, a stylus, and a thread follower for the feed screw, both carried by the sound reproducing mechanism and responding to the pivotal motion thereof, a second thread follower pivotally supported on the sound reproducing mechanism and adapted to engage with the repeater screw, means for turning the second thread follower around its pivot in one direction so as to cause it to engage with the repeater screw thereby lifting the sound reproducing mechanism around its pivotal support and raising the stylus out of engagement with the record and the first thread follower out of engagement with the feed screw, and means for turning the second thread follower around its pivot in the other direction so as to cause it to disengage with the repeater screw thereby allowing the sound reproducing mechanism to descend and the first thread follower to engage with the feed screw, and the stylus to engage with the record.

6. In a phonograph, the combination of a record, a transversely movable sound reproducing mechanism pivotally supported, a feed screw, a double reversely threaded repeater screw, a stylus, and a thread follower for the feed screw, both carried by the sound reproducing mechanism and responding to the pivotal motion thereof, a second thread follower pivotally supported on the sound reproducing mechanism and adapted to engage with the repeater screw, means for turning the second thread follower around its pivot in one direction so as to cause it to engage with one thread of the repeater screw thereby lifting the sound reproducing mechanism around its pivotal support and raising the stylus out of engagement with the record and the first thread follower out of engagement with the feed screw, means for causing the second thread follower to engage with the other thread of the repeater screw thereby reversing the motion of the sound reproducing mechanism, and means for turning the second thread follower around its pivot in the other direction so as to cause it to disengage with the repeater screw thereby allowing the sound reproducing mechanism to descend and the first thread follower to engage with the feed screw, and the stylus to engage with the record.

7. In a phonograph, the combination of a shaft, a record carrier mounted thereon adapted to support a plurality of records, a sound reproducing mechanism, means for re-

ciprocating the sound reproducing mechanism, a cam having a ratchet and pawl connection with the said shaft, and means carried by the sound reproducing mechanism
5 for engaging with the said cam to rotate the shaft during the return stroke of the sound reproducing mechanism.

8. In a phonograph, a record carrier comprising: a shaft, a fixed hub section, a plurality of spindles for supporting records, fixed
10 on the hub section, a second hub section adapted to engage with the free end of the fixed spindles, a spring for pressing the said second hub section away from the spindles,
15 means for confining the said second hub section against the spindles, which when released allows the said spring to move the second hub section out of engagement with the

spindles, whereby the said second hub section can be turned out of the plane of the
20 records so that the latter can be removed from the spindles.

9. In a phonograph, the combination of a sound reproducing mechanism, a double reversely-threaded screw, and a thread follower
25 connected to the sound reproducing mechanism and adapted to engage with the threads of the screw to move the sound reproducing mechanism in both directions.

Signed at New York city this 7th day of
May 1907. 30

CHARLES THOMA, JR.
WALTER THOMA.

Witnesses:

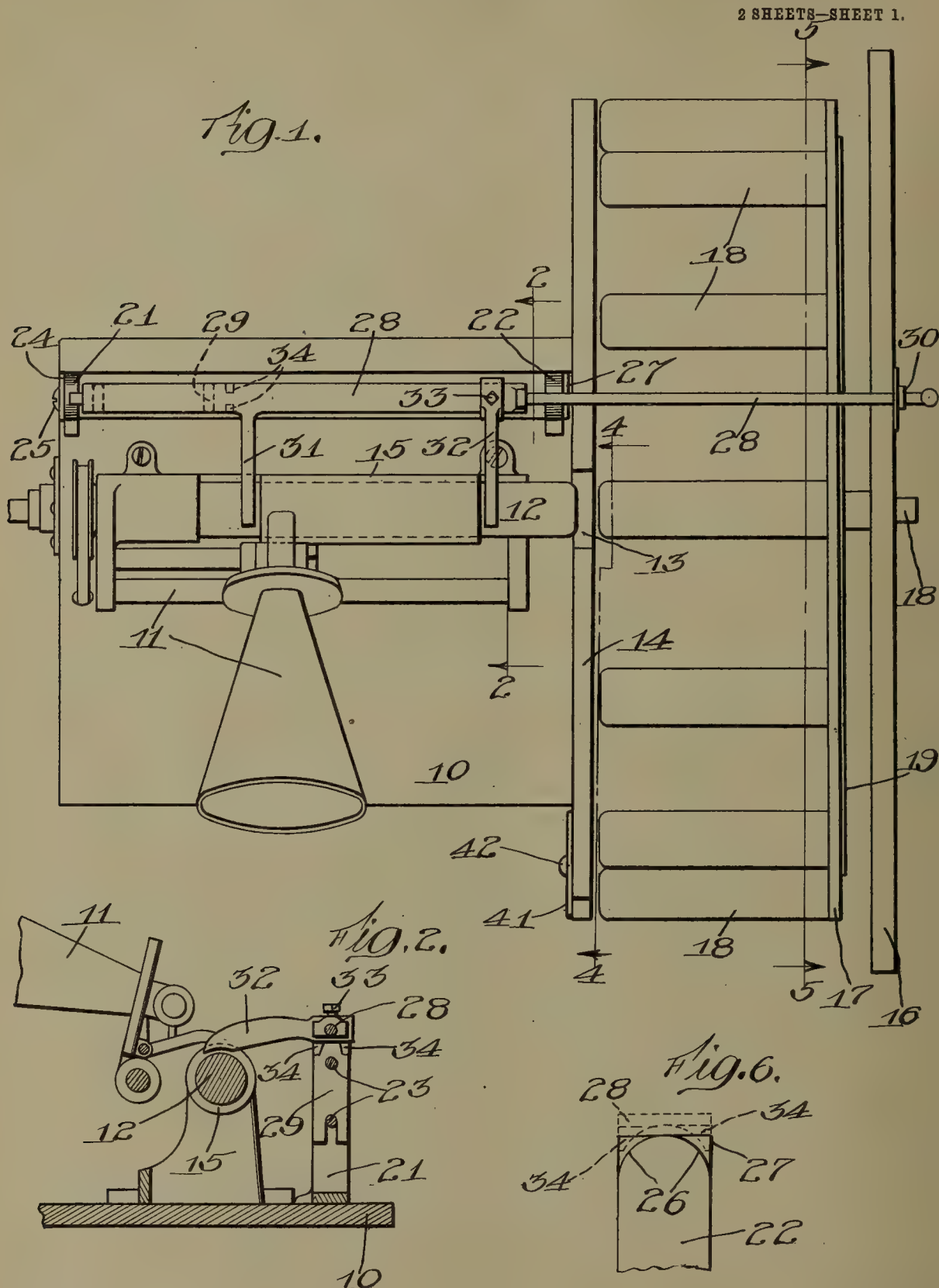
AXEL V. BEEKEN,
GEO. A. MARSHALL.

T. V. SKELLY.

RECORD HOLDING AND SHIFTING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED MAY 25, 1906.

2 SHEETS—SHEET 1.



Witnesses:
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 Arthur H. Weir

Inventor:
 Thos. V. Skelly
 by Brown & Clarke Attorneys

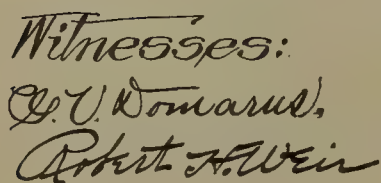


PATENTED DEC. 24, 1907.

RECORD HOLDING AND SHIFTING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED MAY 25, 1906.

2 SHEETS—SHEET 2.



18
Thos. V. Stille
by Brown & Shyler & Co. Pm's
Attys

UNITED STATES PATENT OFFICE.

THOMAS V. SKELLY, OF CHICAGO, ILLINOIS.

RECORD HOLDING AND SHIFTING ATTACHMENT FOR PHONOGRAPHS.

No. 874,548.

Specification of Letters Patent.

Patented Dec. 24, 1907.

Application filed May 25, 1906. Serial No. 318,614.

To all whom it may concern:

Be it known that I, THOMAS V. SKELLY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Record Holding and Shifting Attachment for Phonographs, and of which the following is a full, clear, and exact specification.

10 The main objects of this invention are to provide an improved construction for the record shifting apparatus of magazine phonographs or similar devices in which a plurality of records are held in a magazine and arranged so that any of the records may be shifted into operative position with respect to the phonograph or other machine at the will of the operator; to provide, in a mechanism of this class, a structure which will insure proper alinement between the phonograph support and the supports of the magazine when shifting records from one to the other, which will prevent the shifting of the magazine when a record is removed therefrom, and which will prevent the operation of the record shifting apparatus except when the magazine is properly positioned with relation to the holder of the machine; and to provide improved means for causing the shifting mechanism to automatically disengage the record after the same has been properly placed upon the holder of the machine.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in the construction, combination and arrangement of the several features hereinafter described and claimed and shown in the accompanying drawings, illustrating an exemplification of the invention, and in which;

Figure 1 is a diagrammatic top plan view of a phonograph having a record holder attached thereto, constructed in accordance with the principles of this invention. Fig. 2 is a sectional view on line 2—2 of Fig. 1. Fig. 3 is a side elevation of a portion of the holder shown in Fig. 1, partly in section. Fig. 4 is a view of a portion of the holder on line 4—4 of Fig. 1. Fig. 5 is a sectional view on line 5—5 of Fig. 1. Fig. 6 is a detail view of one of the springs for positioning the shifter.

Referring to the drawings, and in which the same reference numerals designate similar parts throughout the several views, the

numeral 10 designates a suitable support upon which rests a phonograph, indicated generally by the numeral 11. The phonograph is provided with the ordinary record mandrel or support 12 but of a length somewhat longer than the ordinary holder or support so as to project beyond the end of the frame of the machine. The free extremity of the holder or support 12 stands adjacent and in close proximity to an aperture or opening 13 in a wall or plate 14, which projects above the support 10. The aperture or opening 13 is of a size slightly larger than the external diameter of the records 15 to permit the records to easily pass therethrough in a manner to be described. A standard or support 16 is secured adjacent to and spaced from the wall or plate 14.

A record magazine comprising a disk or wheel 17, provided with a suitable axle 18, is journaled between the wall or plate 14 and the standard or support 16, and adjacent the latter. This disk or wheel 17 is provided with a plurality of lateral projecting holders or supports 18 secured thereto by one end, and extending substantially across the space between the wall or plate 14 and support 16 and terminating adjacent the said plate or wall 14. Any suitable number of these supports or holders may be employed and are preferably secured adjacent the periphery of the disk or wheel, properly spaced from each other and in such a position that when the disk or wheel 17 is turned about its axis, any one of these supports or holders 18 may be brought into direct alinement with the record holder or support 12 of the phonograph.

Secured to the outer face of the disk or wheel 17 is a supplemental disk or plate 19 which is provided with a plurality of apertures 20, located preferably adjacent the periphery thereof and for a purpose to be hereinafter set forth. Obviously the disks 17 and 19 may be made integral if so desired.

Uprights or standards 21—22 project above the support 10 and are located preferably at the rear of the phonograph 11, and adjacent each end thereof and secured between the standards are guide or track rods 23. Secured adjacent the outer face of the standard 21 is a spring 24, the extremity of which preferably projects above the top thereof, and said spring is held in position in any suitable manner preferably by means of a bolt or screw 25. The upper corners of the standard 22 are preferably rounded or cut off

as at 26, and secured to the outer face of the standard is a spring 27. This spring is so arranged that the corners thereof will extend or project beyond the corners 26 (as more clearly shown in Fig. 6 of the drawings). A rod or bar 28 is provided with depending arms or brackets 29 through which the guide or track rods 23 pass, and serve as a means for supporting and guiding the rod or bar 28. These arms or brackets are located preferably adjacent one end of said rod or bar 28, and the other end thereof projects through, and has a sliding bearing 30 in the support or standard 16.

Projecting laterally from the rod or bar 28, are arms or fingers 31—32. The arm 32 is preferably adjustable with relation to the bar or rod 28, and is held in its adjusted position in any suitable manner, such as by means of a bolt or screw 33. The extremities of these arms 31—32 are adapted to stand adjacent and in close proximity to the record holder 12 of the phonograph 11. Depending from the bar or rod 28, preferably beyond the arm or finger 31, are lugs or projections 34, which are adapted to move over the cut off or rounded corners 26 of the standard 22, and into engagement with the adjacent corners of the spring 27, when the rod or bar 28 is withdrawn in a manner to be set forth. A handle 35 is secured to the end of the bar or rod 28 and is located preferably on the outside of the standard or support 16, and secured to the handle 35 is a rod or bar 36 which is preferably arranged parallel with the rod or bar 28. This rod or bar 36 is adapted to pass through a bearing 37 in the standard or support 16, through one of the apertures 20 in the disk or plate 19, and into a socket or recess 38 (if desired) in the support 10, when the handle 35 is pushed in, and in this position the extremity of the rod or bar 28 stands adjacent the spring 24.

An aperture or opening 39 is provided at any suitable point in the plate or wall 14 and is located in line with the supports or holders 18. The edges of this opening are covered or padded as at 40, to prevent injury to the cylinder when being placed upon or removed from the holders or supports 18 as will be set forth. A suitable door or closure 41 is provided for the aperture or opening 39. This door may be of any suitable construction but is preferably pivoted to the wall or plate 14 as at 42, and has a suitable fastening device 43.

The operation is as follows:—The shifter handle 35 is withdrawn so as to bring the two arms 31—32 over the holders or supports 18, which are secured to the disk or wheel 17, and with one arm adjacent the ends thereof. The rod or bar 36 is of such a length that when the handle is withdrawn it will be removed from the apertures 20 in the disk or plate 19. In withdrawing the handle, the arm 32 will engage the inner face of the disk or wheel 17, and if permitted to remain against the end of the cylinder or record will cause friction and possibly damage the same. In order to cause the arm to automatically disengage this face of the disk or wheel, when the handle is released, the lugs 34 and spring 27 are provided. When the handle is withdrawn the lugs 34 will pass over the upright or standard 22 and against the spring 27, so as to create a tension on the spring. When the handle 35 is released the spring will assume its normal position and cause a slight retrograde motion and draw the arm or finger 32 out of contact with the end of the record 15. In filling the magazine, the door 41 is opened, a cylinder placed upon the support or holder 18 adjacent the opening, and the disk or wheel rotated to bring an empty holder or support 18 adjacent the aperture or opening 39, for the reception of another cylinder. This operation is continued until a cylinder is placed upon each of the supports or holders 18, after which the door is closed and fastened, which prevents accidental displacement of the cylinders. The arms or fingers 31—32, will permit the cylinders to pass between them, as the disk or wheel 17 rotates, and the arm 32 may be adjusted according to the length of the record or cylinder, so that both arms stand adjacent the ends thereof. The disk or wheel 17 may now be turned so as to bring any desired record, which may be ascertained in any suitable manner, adjacent the aperture or opening 13, and opposite the holder or support 12 of the phonograph. The handle 35 is then shoved in, which will cause the rod 28 and arms or fingers 31—32 to move over, and adjacent the holder 12 of the phonograph, carrying with it the record 15 which now stands between the arms or fingers, causing the same to slide off of the support or holder 18 and on to the support or holder 12. When the record has attained the proper position on the support or holder 12, the extremity of the rod or bar 28, engages the spring 24 and exerts a tension thereon, so that when the handle 35 is released the spring 24 will cause the rod or bar 28 to move slightly, thereby causing the arm or finger 32 to move out of engagement with the end of the cylinder. Just as the record or cylinder begins to leave the support or holder 18, the rod or bar 36 passes through one of the apertures 20 in the disk or wheel 19, thereby locking the magazine against rotative movement. The magazine remains locked until the record is withdrawn from the machine and back onto its support or holder 18, which will at the same time withdraw the locking rod 36, to permit free rotation of the disk 17 and records 15. The apertures 20 are so positioned with respect to the holders or supports 18, that when one of the supports is in line with the holder or support 12, one aperture will be in

position to receive the locking rod or bar 36, but should the two holders 12 and 18 be out of a direct alinement the end of the rod or bar would engage the face of the disk or plate 19, and prevent the arm 32 from removing the records or cylinders, thereby producing a positive means for preventing damage to the records, when inserting them into the machine, and a positive lock while in the machine and while withdrawing the same. After the record has been played it may be removed from the machine by withdrawing the handle 35 which will cause the arm or finger 31 to move the record from the support or holder 12 onto the support 18. The rod 36 is of such a length that the end thereof will not pass out of the aperture 20 until the record or cylinder has been entirely withdrawn from the holder or support 12 and the outer end thereof has passed the wall or plate 14.

It is to be understood that it is not desired to be limited to the exact details of construction or the arrangement of the various parts as numerous changes may be made therein without departing from the spirit of the invention.

What is claimed as new is:—

1. The combination of a phonograph having a mandrel for supporting a tubular record, a magazine adapted to support a plurality of such records and movable to bring successive records in alinement with said mandrel, a shifter movable longitudinally of said mandrel for shifting a record to and from said mandrel, and means actuated by said shifter and having interlocking engagement with said magazine whereby said magazine will be locked against movement while a record is displaced from said magazine by said shifter.

2. The combination of a phonograph having a mandrel for supporting a tubular record, a magazine adapted to support a plurality of such records and movable to bring successive records in alinement with said mandrel, a shifter movable longitudinally of said mandrel for shifting a record to and from said mandrel, and means carried by said shifter and having slidable interlocking engagement with said magazine whereby said shifter will be locked against operation except when one of the records in said magazine is in alinement with said mandrel.

3. In a device of the class described the combination of a phonograph containing a record support, a support journaled adjacent the end of the record support, a plurality of record holders carried thereby and adapted to individually aline with the record holder, said holder support being provided with a plurality of apertures, means for shifting the record from the holder to the record support, and means operatively related to the first said means, and adapted to enter one of the apertures in the holder support to lock the

same against movement when the record is being shifted.

4. In a device of the class described the combination of a phonograph, containing a record support, a plurality of record holders journaled adjacent the end of the support and adapted to individually aline with the support, a perforated disk carried by the holders, a movably supported bar, shifting fingers thereon adjacent the record support for moving the record from the holder to the support when the latter is in alinement with said support, and a locking bar, carried by said first bar and adapted to enter one of the perforations in the disk to lock the holders against movement and permit the removal of the record when the holder and record supports are in alinement.

5. In a device of the class described the combination of a phonograph containing a record support, spaced supports adjacent the end of the record support, one of said spaced supports being provided with an aperture adjacent to the end of the record support, a plurality of record holders journaled between the spaced supports and adapted to aline with the record support, a perforated disk carried by the holders, a bar adjacent the record holder, and passing through the spaced supports, fingers carried by the bar, and adapted to engage the ends of the record; a handle connected to one end of the bar, and a locking rod connected to the handle and passing through one of the spaced supports, said locking rod being adapted to enter one of the perforations in the disk to lock the holders, when the fingers are moved to shift the record.

6. In a device of the class described the combination of a phonograph containing a record support, a record holder supported adjacent the end of the support, means for engaging the ends of the record for moving the same from the holder to the support, and means for causing the first said means to automatically disengage the end of the record.

7. In a device of the class described the combination of a phonograph containing a record support, a record holder rotatably supported adjacent the end of the record support, and adapted to aline the records with the support, shifting fingers adapted to alternately engage the ends of the record, means for moving the fingers, to shift the record, and means for automatically causing the engaging finger to move out of contact with the end of the record.

8. In a device of the class described the combination of a phonograph containing a record support, a plurality of record holders adapted to successive aline with the support, means for alternately engaging the ends of the record to shift the same onto or off of the support, and means yieldingly engaging the first said means for automatically causing

the same to move out of engagement with the end of the record.

9. In a device of the class described, the combination of a phonograph containing a
5 record support, a record holder adjacent the end of the support, a sliding bar mounted adjacent the support, means carried by the bar and adapted to engage the ends of the record for moving the same longitudinally, a projec-
10 tion carried by the rod, and means standing within the path of movement of the projection and adapted to be engaged thereby to cause the first said means to move out of en-
15 gagement with the end of the record.

10. In a device of the class described, the combination of a phonograph containing a
15 record support, a record holder adjacent the end of the support, a sliding bar mounted adjacent the support, means carried by the bar and adapted to engage the ends of the record
20 for moving the same longitudinally, a projection carried by the rod and an elastic means standing within the path of movement of the projection and adapted to be engaged there-
25 by to cause the first said means to automatic-ally move out of engagement with the end of the record.

11. In a device of the class described the combination of a phonograph containing a
30 record support, a record holder adjacent the end of the support, a longitudinally movable

bar mounted adjacent the support, means carried by the bar and adapted to automatic-ally engage the ends of the record for moving
35 the same, a lug projecting from the bar, a spring standing within the path of movement of the lug to cause the first said means to dis-engage the record when the bar is moved in one direction, and a spring standing within
40 the path of movement of the end of the bar when moved in the opposite direction to cause the respective first said means to disen-gage the end of the record.

12. In a device of the class described, the combination of a mandrel, a support adapted
45 to hold a tubular record and movable into alinement with said mandrel, a shifter movable along said mandrel and support and adapted to shift a record from one to the other, and yielding means located in position
50 to be engaged by said shifter in its limiting positions and adapted to move the same clear of the record after the record has been shifted

In testimony whereof I have signed my name to this specification, in the presence of
55 two subscribing witnesses, on this 23rd day of May A. D. 1906.

THOMAS V. SKELLY.

Witnesses:

J. H. JOCHUM, Jr.,

C. H. SEEM.

No. 874,819.

PATENTED DEC. 24, 1907.

H. H. ALLISON.
RECORD NEEDLE.

APPLICATION FILED MAR. 18, 1907.

Fig. 1,

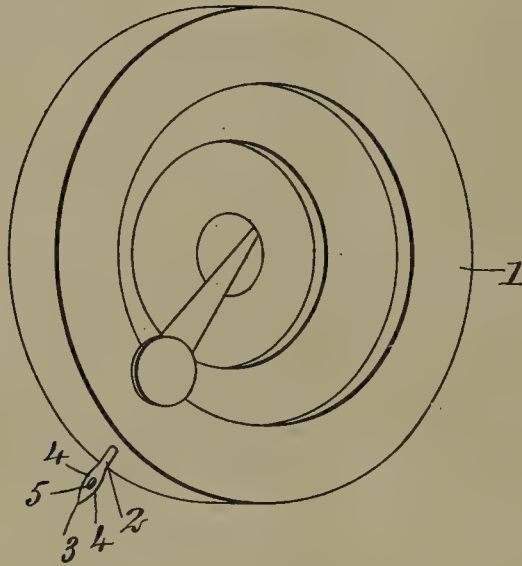


Fig. 2,

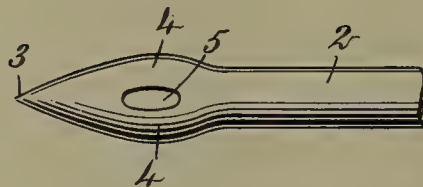


Fig. 3,

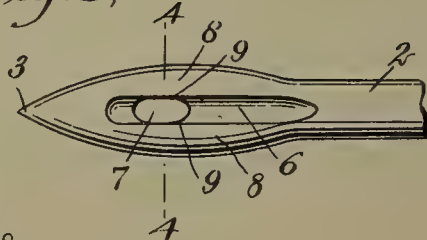
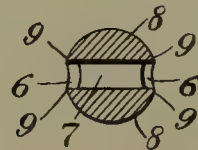


Fig. 4,



WITNESSES

Edward Thorpe,
Edw. W. H. H. H.

INVENTOR

Harvey H. Allison
BY *Munn & Co.*

ATTORNEYS

UNITED STATES PATENT OFFICE.

HARVEY H. ALLISON, OF NEW YORK, N. Y.

RECORD-NEEDLE.

No. 874,819.

Specification of Letters Patent.

Patented Dec. 24, 1907.

Application filed March 18, 1907. Serial No. 362,937.

To all whom it may concern:

Be it known that I, HARVEY H. ALLISON, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Record-Needle, of which the following is a full, clear, and exact description.

This invention relates to needles used in connection with talking machines, and has for its object to provide means capable of producing even, harmonious sounds, free from the chatter, vibrations and strident tones commonly produced by the devices now in use.

Such objects I accomplish by the means illustrated in the accompanying drawings, in which drawings like characters of reference indicate like parts throughout the views, and in which

Figure 1 is a perspective view showing a device embodying my invention applied to the sounding box of a talking machine; Fig. 2 is a side elevation of the device shown in Fig. 1 detached from the sounding box; Fig. 3 is a side elevation of a device embodying a modified form of my device; and Fig. 4 is a cross section taken on the line 4—4 of Fig. 3.

As illustrated in the drawings, 1 represents a sounding box of a talking machine of ordinary construction, to which is attached a needle having a stub shank, adapted to extend between said sounding box and the record of a machine. The needle is provided with a head having a point 3 connected with the shank, by means of arms 4 spaced from each other so as to form a central aperture 5. The head of the needle is preferably made wider

than the shank, and provided with longitudinal grooves 6 on opposite sides of the head having an aperture 7 formed in said grooves, thereby forming oppositely disposed arms 8, preferably segmental in cross section, as illustrated in Fig. 4, so as to form edges 9 on said arms adjacent to said grooves 6.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a talking machine, the combination of a sounding box, and a needle having a shank and a head broader than said shank, provided with a point, and with arms spaced apart connecting the point and the shank of the needle.

2. The combination of a sounding box, and a needle having a shank, and a head provided with a point, and with arms spaced apart connecting the point and the shank of the needle

3. The combination of a sounding box and a needle having a shank, and a head provided with a point, and with an aperture forming arms segmental in cross section connecting said point with the shank of the needle.

4. In a talking machine, the combination of a sounding box, and a needle having a shank, and a head provided with oppositely disposed longitudinal grooves, and an aperture extending through said grooves.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HARVEY H. ALLISON.

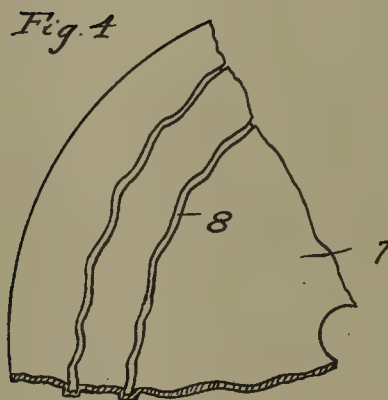
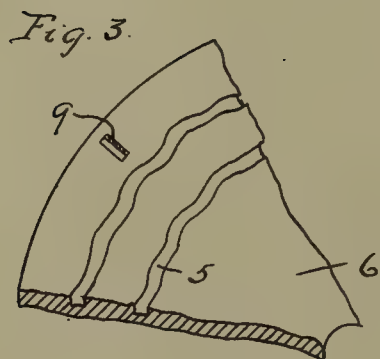
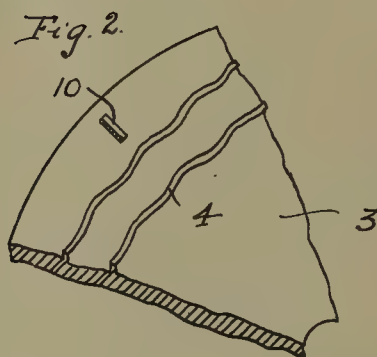
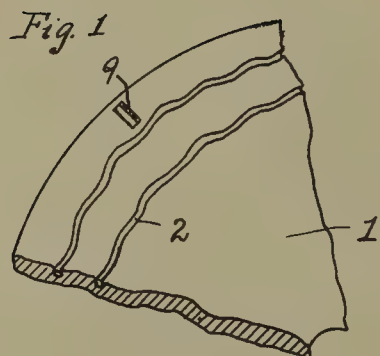
Witnesses:

ROBERT W. HARDIE,
JOHN P. DAVIS.

No. 874,966.

PATENTED DEC. 31, 1907.

I. KITSEE.
METHOD OF MAKING SOUND RECORDS.
APPLICATION FILED JUNE 7, 1907.



WITNESSES:

Edith P. Stille
Mary C. Smith

INVENTOR.

I. Kitsee

UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA.

METHOD OF MAKING SOUND-RECORDS.

No. 874,966.

Specification of Letters Patent.

Patented Dec. 31, 1907.

Application filed June 7, 1907. Serial No. 377,753.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Methods of Making Sound-Records, of which the following is a specification.

My invention relates to an improvement in method of making sound records. Its object is, to produce copies of master records in an efficient and economical manner.

The underlying principle of my invention resides in, first, producing the master record; second, producing a reverse therefrom; and, using both of these records, one as a male, the other as a female, to produce copies by compressing a suitable material between the two records.

It is also one of the features of my invention to enlarge the recording lines on the master record, as will hereinafter be more fully described.

In the drawing, Figures 1, 2, 3 and 4 are perspective views of records.

1 is the master record; 2 the recording lines therefor; 3 the reverse with the recording lines 4; 6 the master record with the enlarged recording lines 5; and 7 is the copy with the recording lines 8.

The mode of operation is as follows: I, first, produce the original or master record of the disk type, in which the undulations of the line represent the undulations or vibrations of the diaphragm. I then produce a reverse of this original record by suitable means, such for instance as an electro-plating process. Both of these records can then be used, one as a male, the other as a female, and suitable material, such for instance as thin metal, placed between them, and the record produced on this metal by the process of stamping or compressing both of the records together, a process which is well understood and does not need further description. But, as the reverse will have the same proportion as the original record, it is, in most cases, required that the lines of the original record should be broadened and especially should be deepened. For this reason, after the reverse is made therefrom, I subject the master record to an etching process, first, providing the surface with a material opaque to the etching fluid. This

process deepens the grooves or lines and broadens the same to a certain extent.

Different materials may be used for the copies, but I have found that aluminium answers the purpose best, for the reason that it is light, ductile, and yet presents a certain strength, even if made in very fine sheets.

It is obvious, that the master record has to be cleaned from the etching fluid, as well as the etch-resisting material on the surface, and the reverse record has to be provided with suitable backing before being employed, to produce copies. It is also obvious, that care should be taken in meshing the original with the reverse, and for that reason, it is preferred that both of them should have either perforations, or, one a deep depression and the other a raised portion in alignment. For this reason, I have provided the original with a center hole and the raised portion 9, and the reverse has, therefore, the center hole and the depressed portion 10.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The method of producing copies of phonographic records, which consists in, first, producing a master record, producing a reverse therefrom, enlarging the lines of the master record, and producing copies by compressing a material between the master record and its reverse.

2. The method of producing copies of phonographic records, which consists in, first, producing a master record; in, second, taking an electro-plating reverse from said master record; third, deepening the recording lines of the master record and, fourth, compressing suitable material between the two records.

3. The process of producing a copy of a master record, which consists in, first, producing a master record and taking a reverse of said record, then enlarging the lines on said master record, and then subjecting a suitable metal to pressure between the master record and its reverse.

In witness whereof I affix my signature in presence of two witnesses.

ISIDOR KITSEE.

Witnesses:

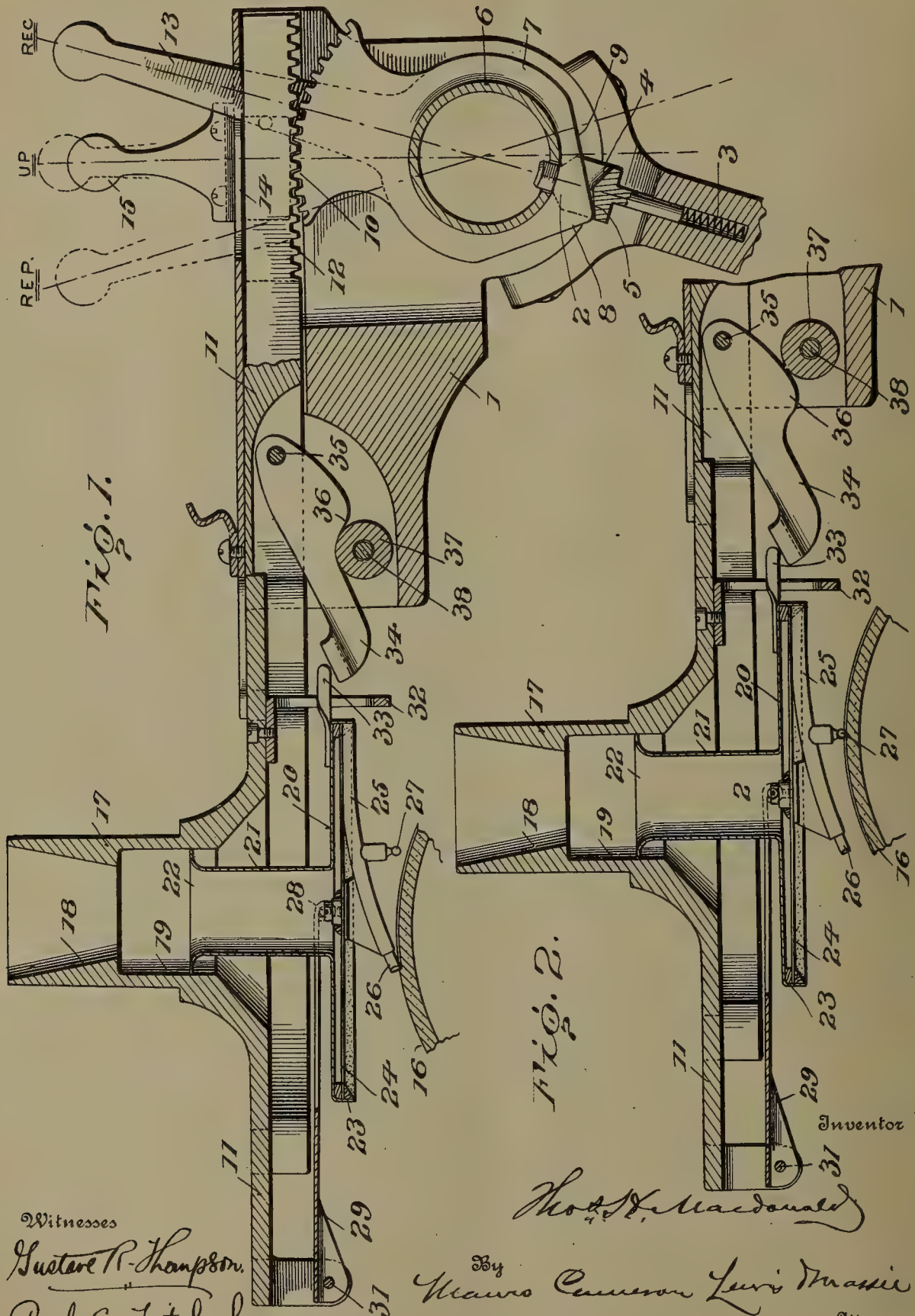
MARY C. SMITH,
H. C. YETTER.

T. H. MACDONALD.

COMBINED RECORDER AND REPRODUCER FOR TALKING MACHINES.

APPLICATION FILED MAR. 27, 1907.

2 SHEETS—SHEET 1.



Witnesses
Gustave R. Thompson.
Arch C. Fitzhugh.

Thos. H. Macdonald
 By *Morris Cameron Lewis*
 Attorney

No. 874,973.

PATENTED DEC. 31, 1907.

T. H. MACDONALD.

COMBINED RECORDER AND REPRODUCER FOR TALKING MACHINES.

APPLICATION FILED MAR. 27, 1907.

2 SHEETS—SHEET 2.

Fig. 3.

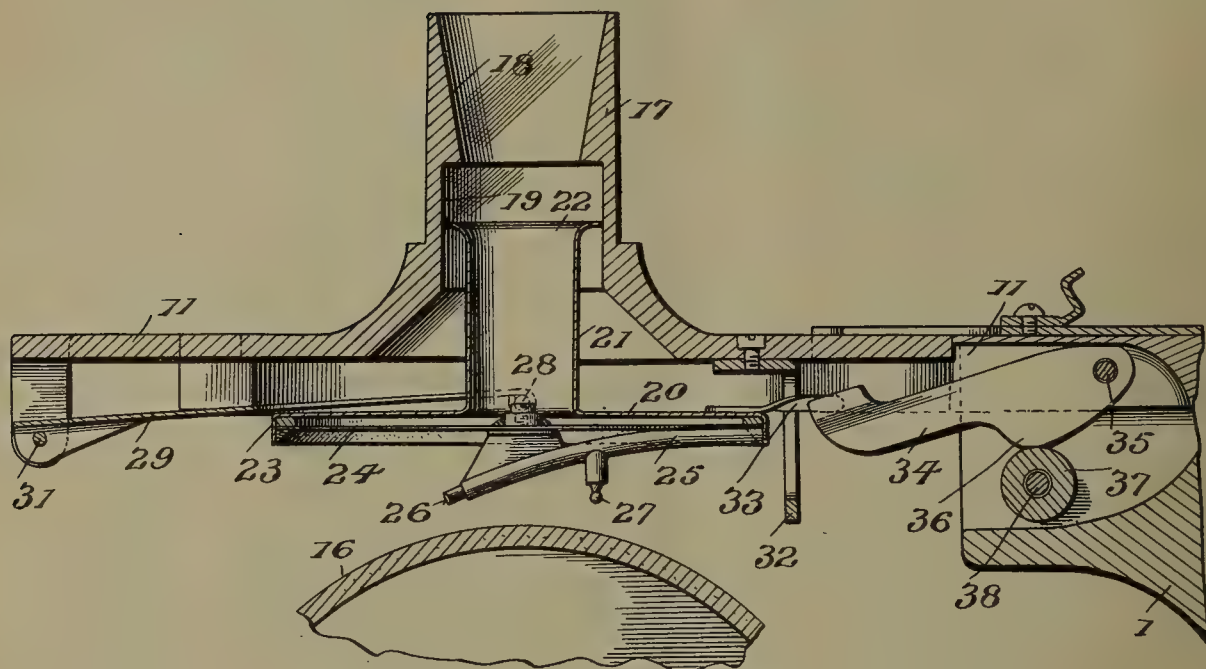
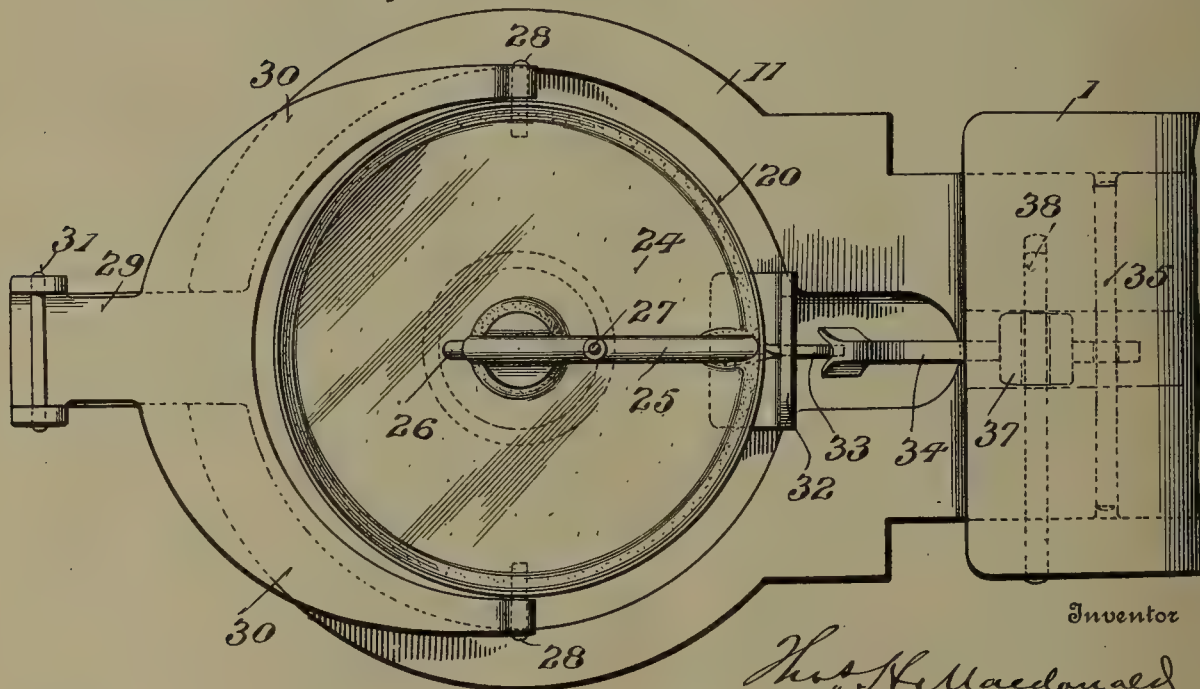


Fig. 4.



Inventor

T. H. Macdonald

Witnesses

Austine R. Thompson.

Ruth C. Fitzhugh

By

Maxwell Cameron Lewis & Massey

Attorneys

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

COMBINED RECORDER AND REPRODUCER FOR TALKING-MACHINES.

No. 874,973.

Specification of Letters Patent.

Patented Dec. 31, 1907.

Application filed March 27, 1907. Serial No. 364,849.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, of Bridgeport, Connecticut, have invented a new and useful Combined Recorder and Reproducer for Talking-Machines, which invention is fully set forth in the following specification.

This invention relates to a combined recorder and reproducer for talking machines, and has for its object to provide such a device which will be readily shifted from the recording to the reproducing action, or from either the recording or the reproducing action to a position of inactivity, while at the same time providing a device which will be simple and cheap to manufacture and efficient in operation.

With these objects in view, the invention consists in a slide and means for operating the same, upon which slide is supported a diaphragm carrying a recording stylus and a reproducing stylus, which diaphragm is supported on the slide by means which, as the slide is reciprocated, will move the diaphragm toward or from the record, as the case may be, while always maintaining the diaphragm in a plane practically parallel with the movement of the slide.

Moreover, the invention further consists in the construction of the recorder and reproducer head whereby the sound-tube or neck leading to the space to the rear of the diaphragm is formed integrally with the head itself, instead of being jointed thereto, as heretofore.

One mechanical expression of the inventive idea is embodied in the accompanying drawings, in which—

Figure 1 is a central transverse vertical section, showing the parts in the position which they occupy when the recording stylus is in contact with the record; Fig. 2 is a like view with the reproducing stylus in contact with the record; and Fig. 3 is a similar view with both the recording and reproducing styli lifted from or out of contact with the record. Fig. 4 is a bottom plan view.

Referring to the drawings, 1 is a part of the carriage of the machine, and 2 is the usual sectional nut by which the carriage is caused to engage the usual or any suitable advancing screw, said nut being normally pressed inward towards the screw by the

spring 3. This nut has two reversely inclined cam surfaces 4 and 5 which meet in a centrally located apex, as shown. Surrounding guide-tube 6 which protects the propelling screw (not shown) is disk 7 having on its lower portion two cam faces 8 and 9, and on its upper portion a segment 10 provided with rack-teeth, as clearly shown in Fig. 1.

Mounted upon the carriage portion 1 is a slide 11 provided on its under side with a rack 12 engaged by the segmental rack-teeth 10, and secured to disk 7 is a handle 13 projecting upward through a slot 14 in the top of the slide, while 15 is an upwardly projecting lug permanently secured to the carriage. The slide projects outward over the record 16 and is provided on its upper side with a horn or sound-tube-receiving neck 17, the interior of the neck tapering as at 18 along its upper portion, but being substantially cylindrical, as at 19, in the lower portion of the neck.

20 is the recorder or reproducer head which has formed integral therewith the upwardly projecting neck 21, which is of less diameter than the cylindrical portion 19, and is provided with a flaring mouth 22 which fits loosely within the cylindrical portion 19. The recorder or reproducer head and the neck or tube 21 are preferably struck-up from a single piece of metal, a depending flange 23 being provided within which is seated the diaphragm 24 held in place by the usual rubber gaskets or any other suitable means. Carried on the diaphragm 24 is the support 25 for the recording stylus 26 and the reproducing stylus 27, which are arranged one behind the other in a plane transverse to the axis of the record 16 and substantially in the line of movement of the slide. The position of the recording stylus 26 and the reproducing stylus 27 is such that when the slide is in the position shown in Fig. 1 the recording stylus is in operative relation with the record 16, the curve of the record, however, being such that the reproducing stylus 27 is out of contact therewith. On the other hand, when the slide is at its extreme left-hand position, as shown in Fig. 2, the recording stylus 26 is out of contact with the record and the reproducing stylus is in contact therewith. It will thus be seen that when

one stylus is in operation the other is substantially on the tangent to the record at the point occupied by the other stylus.

In order to remove the respective styli 5 from contact with the record during the time when the shifting occurs, so as to bring one or the other of the styli into operative position, and also in order to throw both styli out of operation when desired, means are provided 10 whereby the styli are both lifted from the record at a point intermediate of the extreme throw of the slide. In order to accomplish this end and at the same time hold the diaphragm at all times parallel with 15 the face of the slide, the reproducer head 20 is provided with two trunnions 28, 28, Fig. 4, and piece 29 provided with forked arms 30, 30, is pivoted at 31 to slide 11, the outer ends of forks 30 having bearings within which the 20 trunnions 28, 28 rest. Secured to slide 11 is a downwardly projecting slotted lug 32, and projecting through said slot is an arm 33 whose outer end rests on the inclined end of a lever 34 pivoted at 35 to slide 11. This 25 lever 34 has on its under side a cam 36 which rests upon an abutment 37 forming a part of the carriage 1. As here shown, this abutment is in the form of a roller turning upon a pin 38. The construction of the cam portion 30 of the lever 34 is such that when the slide is in its medial position, as shown in Fig. 3, the cam rests upon the roller and thereby raises the lever 34, and, by reason of contact of the lever with the end of arm 33, the diaphragm is also raised, the free sliding movement 35 of flange 22 of tube 21 readily permitting this action. When the slide lever 13 is thrown from the up or medial position (see Fig. 1) to the recording position shown in full 40 lines in Fig. 1, the slide is thrown to the right, and the lever 34 is also thrown to the right so as to withdraw the cam 34 from off the abutment roller 37, thereby permitting the lever to fall and the reproducer head descends by 45 gravity until the recording stylus rests upon the record. When the slide lever 13 is thrown from the up position at the left, however, and into the position shown in dotted lines in Fig. 1, the cam 36 is pushed off of the 50 abutting roller 37 and the lever permitted to descend with the recording stylus 27 in contact with the record, as shown in Fig. 2. During these movements the reproducer head and with it the diaphragm, rises and 55 falls in a horizontal plane, thereby avoiding any rocking of the diaphragm and tendency of the recording stylus to gouge into the record or the reproducing stylus to unnecessarily press thereon, the first and initial part of the movement being to promptly elevate the 60 stylus away from the record in a substantially vertical direction.

When the arm 13 is thrown into the medial or up position (Fig. 1) the apex lying 65 between the cam faces 8 and 9 of disk 7 prac-

tically rests upon the apex of the nut that lies between the cam faces 4 and 5, thereby pressing the nut against the tension of spring 3 and throwing the nut out of engagement 70 with the screw, and hence stopping the machine. It will be apparent from an inspection of Fig. 1 that when the lever 13 is shifted either from the right or left for throwing the recorder or reproducer into action the pressure 75 on the nut will be removed and the same will be again thrown upward so as to engage the propelling screw.

The stationary upwardly-projecting lug 15 affords a ready means by which the operator can exactly adjust the throw of the lever 13 80 and by placing the thumb and forefinger upon the lever 13 and upon the head of the lug 15 and throwing the lever it can be readily stopped opposite the lug 15, and, as the lever 13 is the longer, its projecting end 85 may be readily operated when it is desired to throw the slide in either direction away from the up or central position.

What is claimed is:

1. The combination of a diaphragm, a recording stylus and a reproducing stylus attached thereto, a slide supporting said diaphragm, and means elevating the diaphragm relative to the slide at a point intermediate 95 the extremes of movement of the slide.

2. The combination of a diaphragm, a recording stylus and a reproducing stylus connected thereto, a slide, means supporting said diaphragm on said slide and parallel therewith, means elevating the diaphragm 100 upon the movement of the slide, and means maintaining the diaphragm parallel with the slide during the elevating movement.

3. The combination of a diaphragm, a recording stylus and a reproducing stylus connected thereto, a slide supporting said diaphragm, and means moving the diaphragm from and permitting it to move by gravity towards the record, and means maintaining the diaphragm substantially parallel with the 110 slide during said movements.

4. The combination of a slide, a diaphragm supported by said slide, a style carried by the diaphragm and in contact with the record tablet, and means carried by the slide 115 and lifting the diaphragm upon the movement of the slide.

5. The combination of a slide and means for reciprocating the same, a diaphragm, a stylus carried thereby and resting by gravity 120 on the record, means lifting the diaphragm from and permitting it to return by gravity towards the record while maintaining the diaphragm at all times substantially parallel with the slide. 125

6. In a combined recorder and reproducer the combination of a diaphragm carrying a recording stylus and a reproducing stylus, a slide, flexible connections between said slide and diaphragm, means carried by the slide 130

and acting to raise said diaphragm and permit it to fall on each forward or backward movement of the slide, and means for reciprocating said slide.

5 7. In a combined recorder and reproducer, the combination of a reciprocatable slide and means for actuating it, with a diaphragm, a head or support therefor, a hinge-piece pivoted to said slide and said diaphragm-head, 10 means carried by the slide and engaging a part of said diaphragm-head, and a device for raising said last-named means and permitting the same to descend by gravity on each full reciprocation of the slide.

15 8. In a combined recorder and reproducer, the combination of a slide having a sound-conveying neck projecting therefrom, a recorder or reproducer-head having an integrally formed neck fitting loosely in the neck 20 on the slide, a diaphragm carried by said slide, a style connected to said diaphragm and normally resting by gravity on the record tablet, and means carried by the slide and acting on the reciprocation of the slide 25 to raise the diaphragm and permit it to again descend by gravity.

9. The combination of a carriage, a slide mounted thereon, means on the carriage whereby said slide may be reciprocated by 30 hand, a diaphragm supporting a recording stylus and a reproducing stylus, a hinge-piece pivoted to the slide and also to the diaphragm at opposite sides thereof, a lever pivoted to the slide and engaging the diaphragm-head, and means on the carriage engaging 35 and elevating said lever at the medial point of each reciprocation of the slide but permit-

ting said lever to fall when said medial point is passed.

10. The combination of a carriage, a slide 40 mounted thereon, means on the carriage whereby said slide may be reciprocated by hand, a diaphragm supporting a recording stylus and a reproducing stylus, a hinge-piece pivoted to the slide and also to the dia- 45 phragm at opposite sides thereof, a cam-lever fulcrumed on the slide, an abutment on the carriage and engaged by the cam on the said lever, the construction of the cam being such that the lever is elevated at the medial point 50 of the slide's movement and permitted to fall as the slide is moved to either side of said medial point.

11. The combination of a slide, a diaphragm carrying a recording stylus and a re- 55 producing stylus and supported on said slide, a carriage for said slide having a spring-pressed feed-screw nut thereon, and means simultaneously depressing said nut against its spring and actuating said slide. 60

12. The combination of a slide having a tube or neck, a diaphragm-head having a tubular neck integral therewith and entering the neck on the slide, a diaphragm carried by said head, and a recording stylus and a re- 65 producing stylus carried by said diaphragm.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOS. H. MACDONALD.

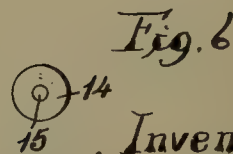
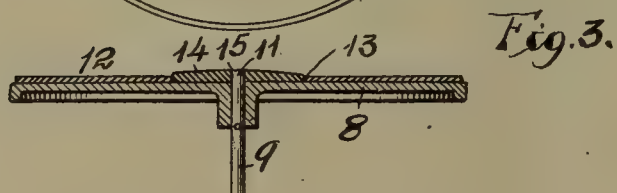
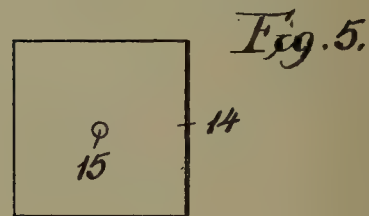
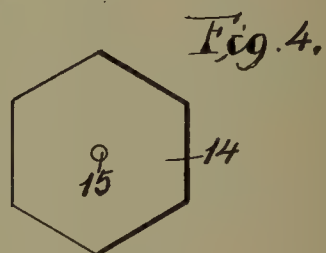
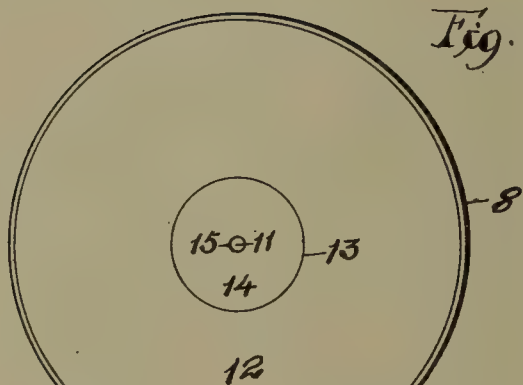
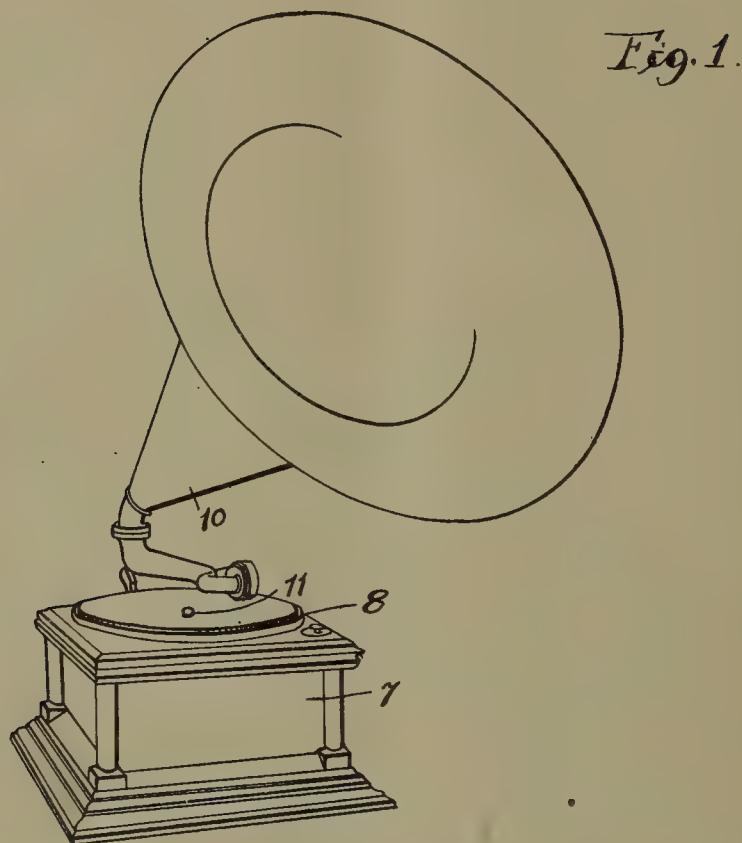
Witnesses:

A. B. KEOUGH,
C. A. GIBNER.

No. 874,985.

PATENTED DEC. 31, 1907.

A. J. O'NEILL.
TALKING MACHINE.
APPLICATION FILED APR. 11, 1907.



Witnesses
W. P. Bond
Percy A. Banning.

Inventor:
by Arthur J. O'Neill
Banning & Banning
Attys

UNITED STATES PATENT OFFICE.

ARTHUR J. O'NEILL, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE ARETINO COMPANY, OF CHICAGO, ILLINOIS.

TALKING-MACHINE.

No. 874,985.

Specification of Letters Patent.

Patented Dec. 31, 1907.

Application filed April 11, 1907. Serial No. 367,541.

To all whom it may concern:

Be it known that I, ARTHUR J. O'NEILL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

In the sale of talking machine records, it is desirable that the record be shaped with special reference to the machine for which it is primarily intended in order that the manufacturers of machines may control the sale of records to be used therewith. This policy enables the manufacturer to sell or rent a talking machine at low cost and thereafter make a reasonable profit out of the sale of records therefor. It is obvious, however, that if the machine is so constructed as to permit the use of records of all styles and sizes it will be difficult, if not impossible, to control the sale of records to the user of the talking machine, whereby the major portion of the talking machine business will be lost with the profits incident thereto. It is desirable, however, that records, peculiarly constructed for use on a particular machine, be usable on machines of different makes in order that the sale of records may be increased to the greatest possible extent.

With this end in view, the object of the present invention consists in the provision of a record of distinctive shape which can be used on talking machines of standard make by the employment of the supplemental disk or plate, which more especially forms the subject matter of the present invention. This enables a record, designed for a particular machine, to be employed on all machines without permitting standard records to be used upon the particular machine.

The invention consists in the features of construction and combination of parts hereinafter described and claimed.

In the drawings, Figure 1 is a perspective view of a talking machine of standard make; Fig. 2 a top or plan view of the turntable, record, and supplemental disk or plate of the present invention; Fig. 3 a sectional elevation of the parts shown in Fig. 2; and Figs. 4, 5 and 6 various styles of supplemental disks or plates of various shapes and sizes.

The talking machine is of standard construction, comprising a box 7, a turntable 8 mounted upon a revoluble vertical shaft 9, a

horn 10, and other features which need not be described. The upper end of the shaft 9 projects above the top of the turntable in the form of a stud 11. The turntable is of the usual disk shape formation and is rigidly secured to and revoluble with the shaft. In ordinary talking machine constructions, the record is in the form of a flat disk of vulcanite, or similar substance, provided with a hole which closely embraces and surrounds the stud-like end of the shaft, which latter serves to position and center the record. The record which is particularly contemplated in the present application is one of the forms shown in Fig. 2 and 3. It is shaped in the form of a ring 12 having an enlarged hole or opening 13 in the center. A ring-shaped record of this character is primarily designed with special reference to a particular style of talking machine. It is desirable, however, that such a record be usually upon a talking machine of the style illustrated in the drawings, for which purpose a supplemental disk or plate 14 is employed, which is provided in its center with a hole or perforation adapted to closely embrace the stud-like end of the shaft, and the supplemental disk or plate is so shaped or proportioned as to entirely fill up the opening in the ring-shaped record, thereby enabling such a record to be properly centered and used on a machine of ordinary make, like that illustrated. The supplemental disk 14, as shown in Figs. 2 and 3, is of circular formation, which permits the particular style of record shown to register therewith. It is obvious, however, that records might be made having hexagonal or square openings, in which case supplemental disks or plates, as shown in Figs. 4 and 5 respectively, might be employed. Likewise a similar opening in the center might necessitate the use of a supplemental disk of small size, like that shown in Fig. 6.

In the use of the present invention, the purchaser of records designed primarily for use on a particular machine of peculiar formation can be furnished with one or more supplemental disks of a proper shape to permit the records thus purchased to be used on any style of talking machine, thereby enlarging the scope or usefulness of the records without enabling standard records to be used on the talking machine of particular or peculiar construction.

The use of supplemental disks or plates

and the ring-shaped records has further advantages in that it minimizes the amount of vulcanite or similar material which must be used in the making of records and facilitates the centering of the records on the talking machine.

What I regard as new and desire to secure by Letters Patent is:

1. The combination of a phonograph turntable, a stud upwardly extending from the center of the turn table, a supplemental disk shaped plate provided in its center with an opening to receive the stud, the opening being of suitable size to permit the supplemental plate to be slipped down over the stud to lie in facial contact with the turn table, the supplemental plate being removable from the stud and removably mounted on the turn table, a ring-shaped flat record having in its center an opening of suitable size to permit the record to be laid in facial contact with the turn table and closely surround the disk-

shaped plate, the plate serving to properly center the record and being of a size and shape to permit the removal of the record without disturbing the supplemental plate, substantially as described.

2. The combination of a talking machine turntable, a stud upwardly extending from the turntable, a supplemental disk-shaped plate provided with an opening adapted to receive the stud, the supplemental plate being removable from the stud and removably mounted on the turntable, and a ring shaped flat record, having in its center an opening of suitable size to permit the record to be laid in facial contact with the turntable, said record being removable from said turntable and said disk while said disk remains upon said turntable, substantially as described.

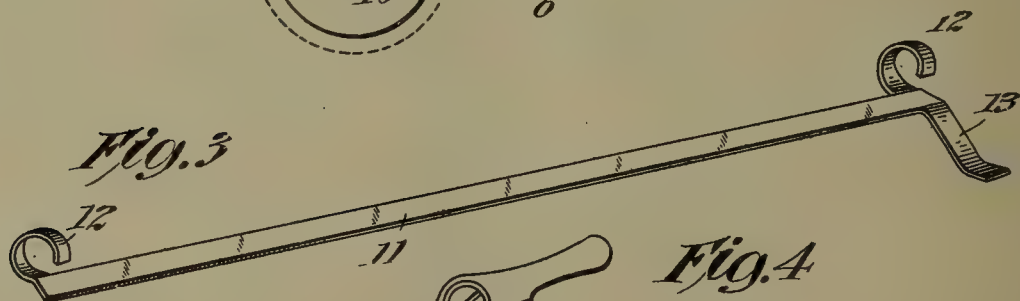
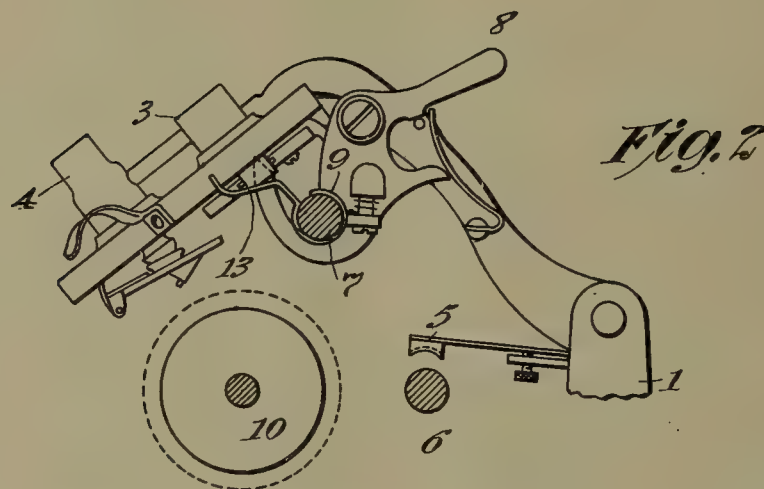
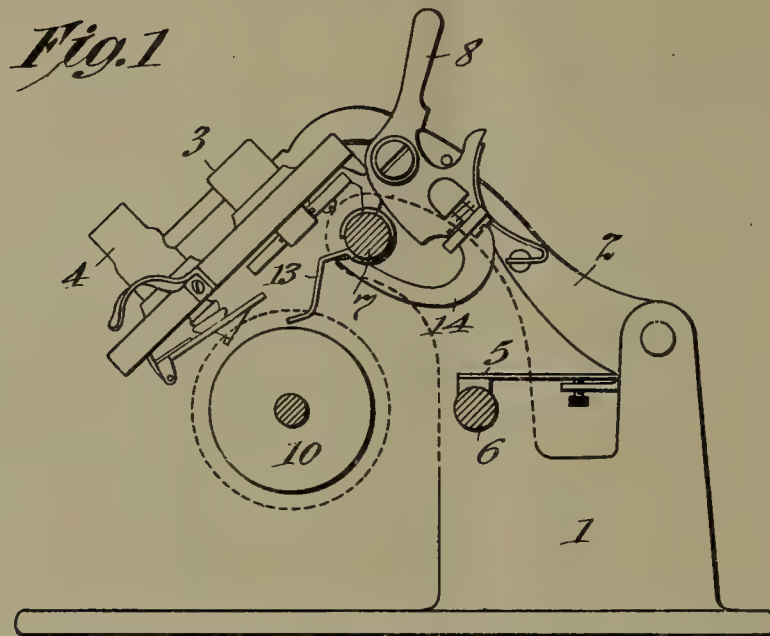
ARTHUR J. O'NEILL.

Witnesses:

EPHRAIM BANNING,
OSCAR W. BOND.

E. L. AIKEN.
PHONOGRAPH.

APPLICATION FILED OCT. 11, 1907.



Witnesses:
Frank D. Lewis
H. H. Dyke

Inventor:
Edward L. Aiken
by Frank L. Ryan
Atty.

UNITED STATES PATENT OFFICE.

EDWARD L. AIKEN, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY,
OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

No. 875,309.

Specification of Letters Patent.

Patented Dec. 31, 1907.

Application filed October 11, 1907. Serial No. 396,875.

To all whom it may concern:

Be it known that I, EDWARD L. AIKEN, a citizen of the United States, and a resident of Orange, in the county of Essex and State

of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs and particularly to means for positively preventing the placing of a phonograph blank or record on the mandrel, or removing it therefrom, when the recorder or reproducer is in such position that they would be liable to be injured by such record or blank. Since, in order to properly reproduce or record sounds on a phonograph it is necessary that the reproducer stylus or recording stylus shall rest upon the record, a lifting lever is provided by means of which the recorder or reproducer may be lifted away from the record surface. If, however, a record or blank were to be placed upon the mandrel without first operating the lifting lever to raise the recorder or reproducer, whichever happens to be in use, the stylus will be suspended in the path of the record and there will be danger of the stylus or its support being broken, or, if the cylinder is removed from the mandrel without first raising the recorder or reproducer away from the surface of the cylinder, the cylinder will be scratched in being so removed and injury may be done to the recorder or reproducer.

The object of the present invention is to provide a device which shall prevent such breakage in the placing of a cylinder on the mandrel and will prevent the removal of the cylinder from the mandrel unless the recorder or reproducer is first raised so that the stylus will be lifted above the path of the cylinder which is being inserted or removed.

I have shown my invention as applied to the Edison business phonograph, but it is evident that it is applicable to phonographs and talking machines of other types.

In the drawing which forms a part of this specification, the same reference numerals are applied to the same parts throughout.

In the said drawing, Figure 1, is a cross-sectional detail view showing the application of my invention to an Edison business phonograph; Fig. 2, is a similar view showing a different position of the lifting lever; Fig. 3, is a view in perspective of the device for preventing the insertion or removal of a cylin-

der, except at the proper time; and Fig. 4, is a detail view similar to Fig. 2, but taken on a plane at some distance behind the plane upon which the view shown in Fig. 2 is taken.

The reference numeral 1 indicates the frame of the machine, and 2 the carriage. The reproducer 3 and recorder 4 are mounted upon a spectacle frame upon the carriage in the well-known manner. The carriage is actuated by means of a feed nut 5 resting upon the feed screw 6. When in position for recording or reproducing the carriage is supported upon the guide rod 7 and a lifting lever 8 is provided to raise the carriage and to thereby disengage the feed nut 5 from the feed screw 6. Fig. 1 shows the carriage resting directly upon the guide rod 7 while Fig. 2 shows the lifting lever 8 pushed backward so that the carriage is supported upon the guide rod 7 by means of the recessed portion 9 of the said lifting lever. When in this position the recorder and reproducer are supported well above the recording cylinder.

In order to prevent a record cylinder being placed upon or removed from the mandrel when the recorder or reproducer is in the lowered position shown in Fig. 1, in which position there would be danger of breaking the recorder or reproducer, or of scratching the record, I provide a bar 11 having hook-shaped members 12, which encircle the guide rod 7 near the ends thereof, and also provided with a forwardly and downwardly extending arm 13.

The lifting lever 8 is provided with a finger 14 having a beveled end 15, which extends forward beneath the guide rod 7. This finger has been heretofore used to prevent the raising of the carriage and the spectacle frame more than a prescribed distance, but according to my invention, I cause this finger to perform an additional function—that of supporting and actuating the bar 11 and the arm 13 in such manner that the arm 13 stands in the path of the cylinder and opposes its being placed upon or removed from the mandrel when the carriage is in its lowered position, and when the lifting lever is actuated to raise the carriage so that the recorder or reproducer is moved away from the path of the cylinder to be inserted, this finger 14 operates to turn the bar 11 and raise the arm 13 so that it will no longer oppose the placing of a cylinder upon or removing it from the mandrel. As the bar 11

and its connected parts do not move longitudinally while the carriage and lifting lever 8 is moved transversely of the record by means of the feed screw 6, it will be evident
5 that the beveled finger 14 of the lifting lever 8 will engage the bar 11 throughout the entire length of the latter as the carriage is moved.

Having now described my invention, I
10 claim—

1. In a phonograph, the combination of means for holding a record tablet, a stylus, and an arm, each movable toward and from the tablet holding means, the arm serving to
15 oppose movement of the tablet when moved toward said tablet holding means, and means for moving the stylus and arm simultaneously, substantially as set forth.

2. In a phonograph, the combination of a
20 mandrel, a movable carriage, a lever for lifting said carriage, and means for preventing the placing of a record on the mandrel when the carriage is in its depressed position, the said means permitting the placing of a record
25 upon the mandrel when the carriage is raised, substantially as set forth.

3. In a phonograph, the combination of a mandrel, a carriage, a lifting lever for said carriage and means under the control of the
30 said lifting lever which prevents the placing of a record on the mandrel or removing it therefrom when the carriage is in its depressed position, substantially as set forth.

4. In a phonograph, the combination of a

mandrel, a carriage movable up and down, 35 means normally resting in position to prevent the placing of a cylinder upon the mandrel and means for lifting the carriage and moving the first named means away from the position in the path of the cylinder, sub- 40
stantially as set forth.

5. In a phonograph, the combination of a mandrel, a carriage movable up and down, a guide rod for supporting said carriage, means rotatable upon said guide rod and normally 45
standing in position to prevent the movement of a cylinder upon the mandrel and means for raising said carriage and moving said cylinder obstructing means out of the obstructing position, substantially as set 50
forth.

6. In a phonograph, the combination of a mandrel, a carriage, a guide rod on which the carriage rests, a bar extending parallel to said guide rod and having hook-shaped 55
members encircling said guide rod near the ends thereof, and provided with a downwardly and forwardly extending arm and means for raising said carriage and turning said bar with respect to said guide rod, sub- 60
stantially as set forth.

This specification signed and witnessed this 10 day of October, 1907.

EDWARD L. AIKEN.

Witnesses:

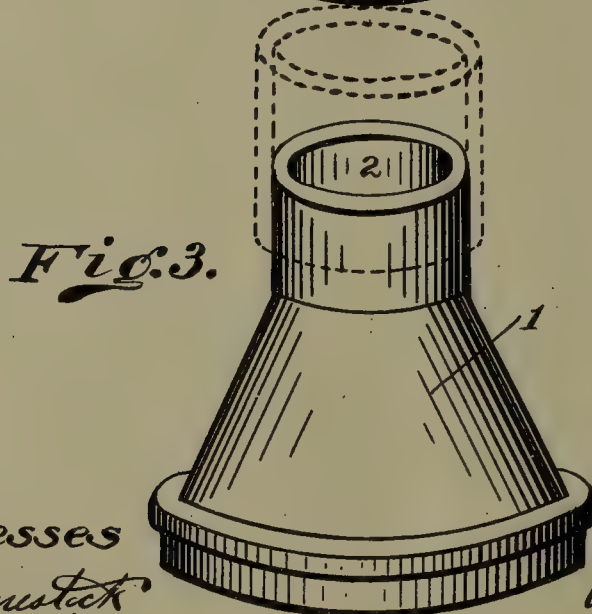
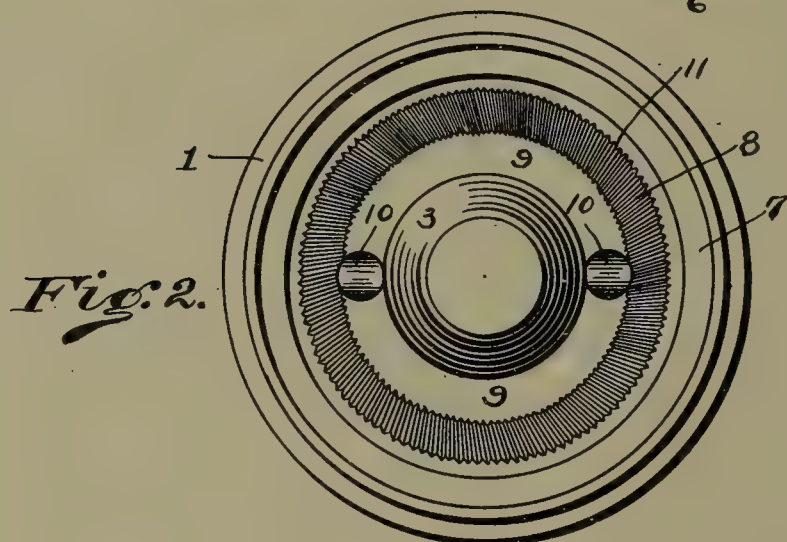
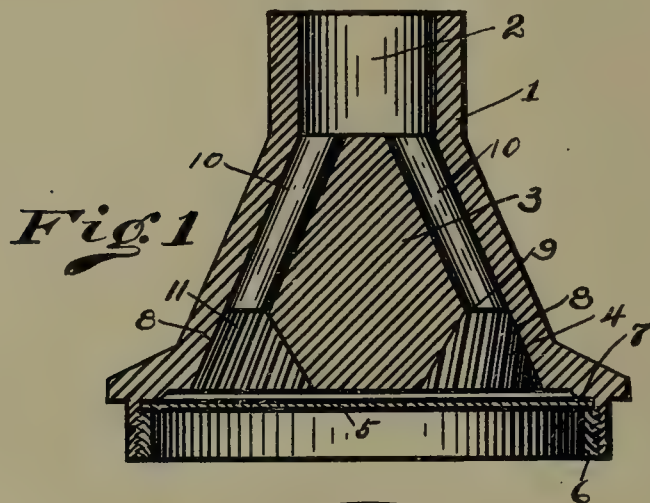
H. H. DYKE,

CHARLES F. ROBSON.

No. 875,352.

PATENTED DEC. 31, 1907.

W. N. HUNTER.
SOUND RECORDER FOR TALKING MACHINES.
APPLICATION FILED JULY 28, 1906.



Witnesses
C. M. Palmistock
A. O. Hargill

Inventor
William N. Hunter
by Alfred M. Allen
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM N. HUNTER, OF BLANCHESTER, OHIO.

SOUND-RECORDER FOR TALKING-MACHINES.

No. 875,352.

Specification of Letters Patent.

Patented Dec. 31, 1907.

Application filed July 28, 1906. Serial No. 328,172.

To all whom it may concern:

Be it known that I, WILLIAM N. HUNTER, a citizen of the United States, residing at Blanche-
5 Ohio, have invented certain new and useful Improvements in Sound-Recorders for Talking-Machines, Telephones, and the Like, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to devices for taking and receiving the sound waves developed by a vibrating diaphragm, whether vibrated
15 directly, or by mechanical action, to collect the waves and deliver the vibrations into a tubular passageway, and the object of the invention is to provide a chamber for the reception of the wave vibrations, with a plurality of passageways therefrom into the conveying tube, whereby the vibrations may be collected, condensed, and delivered more perfectly than with the sound recorders heretofore in use.

Heretofore it has been customary for talking machines and the like to provide a cup shaped chamber in the rear of the diaphragm, which receives the sound vibrations, and to deliver these vibrations from the recorder
30 through a single central passageway. I have ascertained by repeated experiments, however, that if an annular chamber is provided and the sound waves conveyed into the tubular passageway through a plurality of openings from this annular chamber, a very much smoother and better volume of sound is produced, or conveyed by the apparatus.

While my improved construction can be employed for the collection and conveyance
40 of sound vibrations delivered directly into the recorder, my device is especially adapted for recorders for talking machines where the vibrations are developed mechanically, and for such machines I have found that extraneous sounds produced by the scratching of the recording point as it passes over the plate or cylinder, upon which is impressed the record to be reproduced are almost completely cut out, so that a pure and sweet volume of sound is reproduced identical with the original sound waves delivered to the apparatus.

In the drawings Figure 1 is a central vertical section of my improved sound recorder.
55 Fig. 2 is a plan view of same. Fig. 3 is a perspective view.

In the drawings, in order to illustrate the construction more effectually, the device as used in connection with the ordinary talking machines is illustrated as enlarged to about
60 twice its natural size.

1 is a cone shaped casing provided with a tubular passageway 2, and a central boss 3 to form at the receiving end of the receptacle an annular chamber 4.
65

5 is the diaphragm of any suitable material, which is held in position by the ring 6 with its periphery resting on the flange 7, and with washers interposed between the diaphragm and the supporting flange and
70 retaining ring. The central boss 3 which divides the chamber into an annular one is cone shaped with the truncated apex of the cone approaching very close to the diaphragm, but without touching it. The outer
75 walls 8 of the annular chamber 4 converge inwardly, so that a narrow base 9 is provided for the annular chamber. From the base of this chamber two passageways 10—10 are provided which merge into the tubular pas-
80 sageway 2. These passageways 10—10 are on opposite sides, and the outer wall of the annular chamber is provided with grooves 11 as indicated in Figs. 1 and 2, which are cut spirally, as shown, to gather and direct the
85 waves of sound towards the passageways 10—10.

When my apparatus is used as a sound recorder for talking machines, the usual arrangement is provided for conveying the vi-
90 brations from the record cylinder, or plate, to the diaphragm by means of a pin or needle attached to the center of the diaphragm.

With the foregoing construction, it will be evident that the central vibration of the dia-
95 phragm is not directly conveyed into the sound recorder, and that the vibrations are received therein from the outer portions of the diaphragm and collected by the grooved converging walls into the two passageways,
100 which take the vibrations from the sides.

Without endeavoring to express any theory concerning this matter, I have found that with my construction, as heretofore stated, that the scratching and other mechanical
105 sounds created by the talking machine apparatus are cut out, and that much purer, sweeter, and more natural tones are reproduced than with sound recorders in which the vibrations are collected and conveyed
110 centrally by the recorder.*

Having thus described my invention, what

I claim as new and desire to secure by Letters Patent, is:

1. In a sound recorder of the class described, a sound box, with diaphragm therefor, and a collecting chamber for the sound waves of substantial depth, in free communication with and back of the diaphragm, with a central raised portion approaching, but not touching, the diaphragm, and forming an annular collecting chamber, and a tubular passageway for the conveyance of the sound waves, with an opening therefrom into the annular collecting chamber.

2. In a sound recorder of the class described, a sound box with diaphragm therefor, and a collecting chamber for the sound waves of substantial depth, in free communication with and back of the diaphragm, with a central raised portion approaching, but not touching, the diaphragm, and forming an annular collecting chamber, and a tubular passageway for the conveyance of the sound waves, with a plurality of openings therefrom into the annular chamber.

3. In a sound recorder of the class described, a sound box with diaphragm therefor, a collecting chamber of substantial depth for the sound waves at the rear of the diaphragm, said collecting chamber being provided with a converging outer wall, and having a central boss approaching but not touch-

ing the diaphragm, so as to form an annular collecting chamber, a tubular passageway for the conveyance of the sound waves, and an opening therefrom into the annular collecting chamber.

4. In a sound recorder of the class described, a sound box with diaphragm therefor, a collecting chamber for the sound waves at the rear of the diaphragm, with a central boss approaching but not touching the diaphragm, and forming an annular collecting chamber, said chamber being provided with converging inner and outer walls, a tubular passageway for the conveyance of the sound waves, and an opening therefrom into the annular collecting chamber.

5. In a sound recorder of the class described, a sound box having an annular collecting chamber of substantial depth formed therein, a vibratory diaphragm in connection therewith, said annular chamber being provided with a converging outer wall grooved substantially as described, a tubular passageway for the conveyance of the sound waves, and a plurality of openings therefrom into the annular collecting chamber.

WILLIAM N. HUNTER.

Witnesses:

GLENA PRITCHARD,
GEORGE BROEMMER.

No. 875,790.

PATENTED JAN. 7, 1908.

G. W. DUNCAN.
GRAPHOPHONE HORN.
APPLICATION FILED FEB. 18, 1907.



FIG. 1

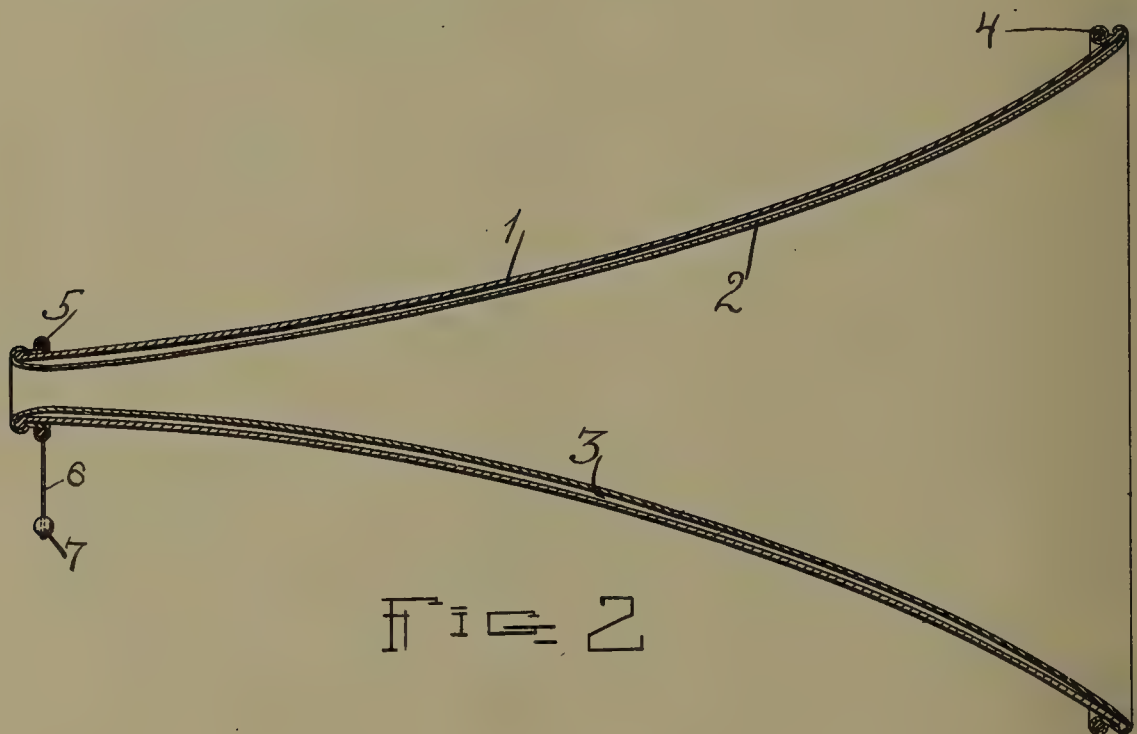


FIG. 2

Inventor

G. W. DUNCAN

Witnesses

J. Milton Jester.
C. H. Griesbauer.

by *A. B. Wilson & Co.*
Attorneys

UNITED STATES PATENT OFFICE.

GEORGE W. DUNCAN, OF CHICAGO, ILLINOIS.

GRAPHOPHONE-HORN.

No. 875,790.

Specification of Letters Patent.

Patented Jan. 7, 1908.

Application filed February 18, 1907. Serial No. 358,077.

To all whom it may concern:

Be it known that I, GEORGE W. DUNCAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Graphophone-Horns; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in graphophone horns.

The object of the invention is to provide a graphophone horn having means whereby all metallic or screeching sounds will be eliminated so that the sounds passing therefrom will have a clear natural tone.

With the foregoing and other objects in view, which will appear as the nature of the invention is better understood, the invention consists in certain novel features of construction, combination and arrangement of parts, as will be hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 is a side view of a horn arranged in accordance with the invention; and Fig. 2 is a longitudinal sectional view of the same.

Referring more particularly to the drawings, 1 denotes a horn which may be constructed of any suitable material such as sheet metal, wood pulp or fiber, paper, board, or other composition. Adapted to be applied to the inner side of the horn is a flexible lining 2 which may be of any suitable construction, but which is preferably formed of cloth or other form of textile fabric. The flexible lining 2 may be applied and secured to the horn in any suitable manner, but is here shown and is preferably hung loosely within the horn and lies a suitable distance therefrom to form between the lining and inner wall of the horn an air space 3. The lining which as before stated is hung loosely in the horn is of somewhat smaller diameter than the latter and in its application to the horn is drawn sufficiently taut to cause it to stand away from the horn's inner surface, thus to preserve the air space 3 which is referred to and as will be readily understood.

The lining 2 is secured at the outer end of the horn preferably by means of an endless elastic cord or band 4 which is fastened to the end of the lining in any suitable manner, said end of the lining being turned over the

outer end of the horn so that the elastic cord or band will engage the outer side of the latter adjacent to the end. Secured to the inner end of the lining is an endless elastic cord or band 5 which when the inner end of the lining is drawn through the smaller end of the horn and turned back over said end will engage the outer side of the horn, as clearly shown in the drawings. The cords 4 and 5 when thus engaged with the horn will securely fasten the ends of the lining while the body portion thereof will stand away from and out of contact with the inner wall of the horn, thus providing for the air space 3, as hereinbefore described.

In order that the end of the lining may be readily drawn through the small end of the horn, I preferably attach a short cord 6 to the inner end of the lining and to the free end of the cord is attached a ball or button. When applying the lining, the inner end of the same is let down into the horn until the ball 7 and cord 6 appear through the smaller end of the horn. The ball is then grasped and the end of the lining readily drawn through the smaller end of the horn and secured, as hereinbefore described.

By providing a flexible lining and arranging the same as herein shown and described, the vibrations of the horn are reduced to such an extent that the metallic sound usually heard in connection with phonograph reproductions will be entirely eliminated.

From the foregoing description, taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention, as defined by the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters-Patent, is:—

1. A phonograph horn having a flexible fabric lining arranged loosely therein to provide an air space between the lining and inner wall of the horn, and means for attaching the ends of the lining to the terminals of the horn.

2. A flexible fabric lining adapted to be applied loosely within a phonograph horn, a cord attached to the smaller or inner end of

said lining, a ball on the end of said cord whereby said lining may be readily drawn through the smaller end of the horn, and endless elastic fastening cords arranged in the
5 opposite ends of said lining to secure the same to the opposite ends of the horn, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GEORGE W. DUNCAN.

Witnesses:

R. W. O'BRIAN,
D. I. WEISZ.

M. SCHWARTZ.
SOUND RECORDER AND REPRODUCER.

APPLICATION FILED MAR. 8, 1907.

Fig. 1.

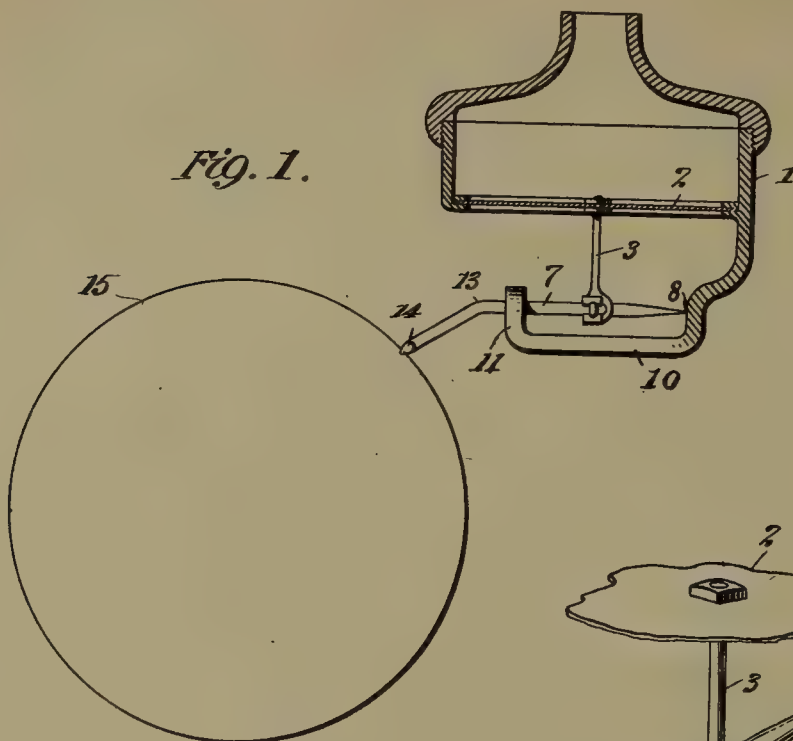


Fig. 2.

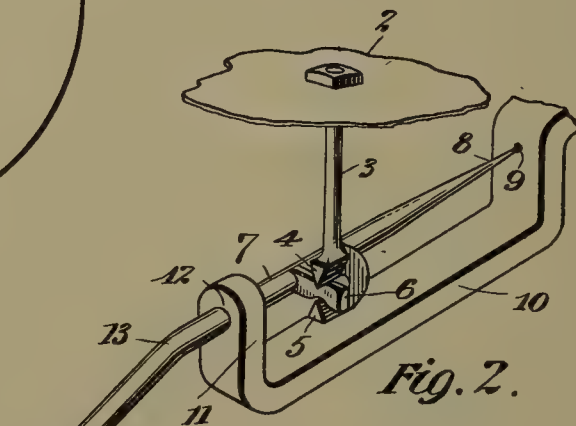


Fig. 8.

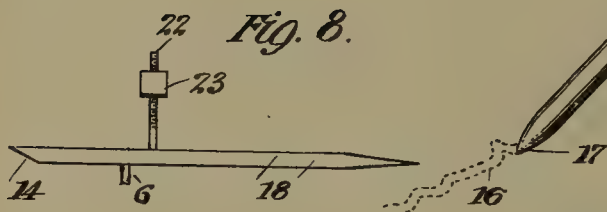


Fig. 6.

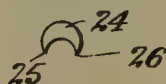


Fig. 7.



Fig. 3.

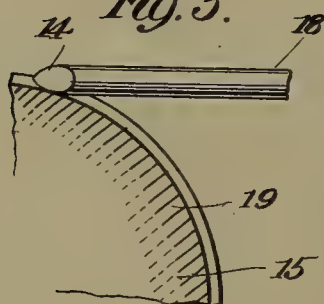


Fig. 4.

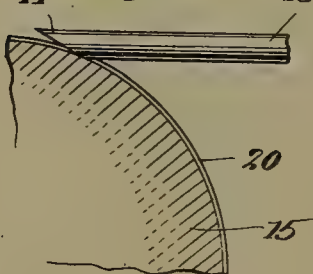
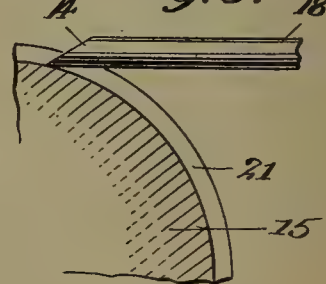


Fig. 5.



Witnesses:
Hans. Ober.
L. V. Sparks

Inventor
Morris Schwartz.
By his Attorney
Willis Fowler.

UNITED STATES PATENT OFFICE.

MORRIS SCHWARTZ, OF NEW YORK, N. Y., ASSIGNOR OF ONE-THIRD TO SOLOMON FLAUM
AND ONE-THIRD TO MAX BORNSTEIN, OF NEW YORK, N. Y.

SOUND RECORDER AND REPRODUCER.

No. 875,853.

Specification of Letters Patent.

Patented Jan. 7, 1908.

Application filed March 8, 1907. Serial No. 361,314.

To all whom it may concern:

Be it known that I, MORRIS SCHWARTZ, a subject of the King of Roumania, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Sound Recording and Reproducing Machines, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same; reference being had to the accompanying drawings, forming part of this specification.

The sound recording and reproducing apparatus or the so-called talking machines, heretofore in use, have undulations or indentations produced by the sound waves recorded either in the base or bottom of the groove cut or formed on the record by the stylus, or in the sides of such groove, in which latter case the groove is sinuous. In many of these known devices only the movement of the diaphragm in one direction, is recorded or reproduced.

My present invention seeks to utilize to the fullest extent the movement of the diaphragm in either direction of its vibration, and a further object of the present invention is to record the undulations of the sound waves in both the sides as well as the bottom or base of the groove, though this is not an essential feature of certain parts of the invention.

Still other objects are to maintain the diaphragm horizontal with the stylus substantially parallel therewith; and further to mount or support the cutting tool or stylus in suitable bearings in a bracket independent of the diaphragm from which the stylus receives its motion through suitable link or other connection.

With these and other objects in view, my invention consists in the various novel and peculiar arrangements and combinations of the several different parts of the apparatus all as hereinafter fully set forth and then pointed out in the claims.

I have illustrated types of my invention in the accompanying drawings wherein:—

Figure 1 shows my improved apparatus in vertical central section with the recording or reproducing stylus bearing upon the cylindrical record. Fig. 2 is an enlarged perspective view of the apparatus together with a diagram in dotted lines of the sinuous record groove. Figs. 3, 4, 5 and 8 are views of mod-

ified forms of the cutting tool or stylus, shown as operating in conjunction with a cylindrical record, which is shown in section in Figs. 3, 4 and 5. Figs. 6 and 7 are end views of modified forms of the point of the stylus or cutting tool.

Referring to the drawings, in which like numbers of reference designate like parts throughout, 1 indicates the ordinary sound box of a sound recording or reproducing instrument and 2 is the ordinary diaphragm thereof which is vibrated by the sound waves. From the center of the diaphragm 2 extends a bar or post 3 which is suitably secured thereto and at its outer end this post is provided with knife edge bearings 4 and 5 arranged opposite to each other, so as to engage upon opposite sides an arm or lateral projection 6 extending from the stylus or cutting tool 7, the rear end 8 of which lies in a socket bearing 9 formed in a suitable part of the bracket 10 which is fixed to and depends from the sound box or frame 1. The body of the bracket 10 extends substantially parallel with the diaphragm 2 and to a point considerably beyond the post 3, and at its outer end is provided with an inwardly projecting part 11 formed with a perforation 12 through which the cylindrical body of the stylus 7 extends, and this forms a substantial and smooth bearing for the body of the stylus, the other bearing at the rear end 9 being in axial alinement with the bearing 12, and the vibrations of the diaphragm 2 serve to rock the stylus 7 on its bearings in one direction as the diaphragm moves inwardly and in an opposite direction as it moves outwardly, thus making the stylus respond to each stroke or movement of the diaphragm.

The outer end of the stylus 7 is bent at an oblique angle, and in the form shown in Fig. 1 the cutting or operative end 14 of the stylus is beveled or formed on a plane oblique to the axial line of the stylus, as more particularly shown in detail in Figs. 3, 4, 5 and 8. The point of the stylus 7 engages the outer surface of the cylindrical record 15, which is rotated in the usual way, and in the construction shown in Fig. 1, the rocking of the stylus 7 on its axis on its bearings, acts to swing laterally the bent end of the stylus so as to form a sinuous groove such as is indicated at 16 in dotted lines in Fig. 2 and so that the sides of the groove receive the record and the undulations of the sound

waves, at the same time the irregular shape of the point 14 of the stylus causes it to vary the depth of the groove, or to produce undulations in the bottom or base thereof, under
 5 the rocking movement of the stylus on its axis, so that the bent end of the stylus together with the peculiarly formed point of the stylus produce a compound result and serve to record the undulations of the sound
 10 waves in the sides as well as in the base or bottom of the groove cut on the record.

In Fig. 2 the point 17 of the stylus 7 is shown as uniformly tapered or of a conical shape so that it produces a sinuous groove
 15 such as 16 in the record, and this stylus likewise responds to the movement of the sinuous sides of the groove in the reproducing.

In Figs. 3, 4, 5 and 8, the stylus 18 is shown as a straight member instead of being bent as
 20 the one shown in Figs. 1 and 2, respectively, and this straight stylus is adapted to be mounted in the same bearings as that indicated in Figs. 1 and 2, and to be rocked on its longitudinal axis in the same manner.
 25 This stylus is so adjusted and related to the other parts, that normally the plane of the beveled or obliquely cut end 14 stands about at right angles to the axis of the cylindrical record, as shown in Fig. 3, in which position
 30 it cuts a groove 19 in the cylinder 15 of considerable depth, but when turned on its axis about one-quarter of a circle it cuts a shallower groove 20, as indicated in Fig. 4 while when turned through a half circle, as shown
 35 in Fig. 5, it cuts a deeper groove than in Fig. 3 as shown at 21. In order to prevent this straight form of the stylus 18 from being forcibly turned on its axis by the movement of the recording cylinder 15, I provide the
 40 same with an adjustable weight consisting of a screw-threaded pin or bar 22 projecting laterally from the stylus 18 and carrying a weight 23 provided with a screw-threaded socket adapted to work on the thread on the
 45 bar 22.

In Fig. 6, I show an end view of a modified form of the stylus 24 and which might be described as crescent shaped having two cutting
 50 points 25 and 26, while in Fig. 7 still another modification of the point of the stylus is shown in the way of a rectangular shape 27, and this also provides more than one cutting point, 28 and 29, the same as the two opposite edges of the beveled end 14 of
 55 the stylus 18. In the form of the stylus in which the operative end or point is of an irregular shape, that is a shape other than uniformly tapered or conical or uniformly rounded, more than one cutting part or edge
 60 is provided, as will be seen by comparing Figs. 3 to 7, and this is purposely designed to record the various undulations of the sound waves. These different forms of the operative or cutting end of the stylus produce dif-
 65 ferent characters of impressions or records

and the same can be made somewhat varied by changing the shape of the operative end of the stylus. When the stylus having this peculiar form of cutting point is turned on its longitudinal axis, the irregular shape of the
 70 point causes it to go deeper into the material of the recording surface or to rise further out of the same according to the degree to which it is turned or rocked and also according to the direction. With these different forms
 75 of the end of the stylus, the same is made to cut the material to make the impressions or records, the position of the stylus being rapidly changed to vary the cutting by the vibrations of the diaphragm. It will be
 80 noted that an important advantage of the construction herewith shown is found in the peculiar mounting of the rocking stylus which relieves the diaphragm of all strain due to the cutting, at the same time of all move-
 85 ments of the diaphragm both above and below the horizontal are recorded.

While I have herewith shown my invention as used in conjunction with a cylindrical record, it will, of course, be understood that
 90 it may be employed with the other well-known forms of records which are made in the shape of flat disks. It will be further understood that this invention may be used both to record or to make records as well as
 95 to reproduce the same and various modifications may be made in the apparatus as herewith set forth without departing from the spirit of the invention.

It will, of course, be understood that in the
 100 accompanying drawings illustrating my inventions in phonographs or in sound recording and reproducing apparatus, the various indentations or grooves indicated in the record are diagrammatic and are accordingly of
 105 an exaggerated character, but they serve the purpose of illustrating the inventions herein set forth and claimed. It will also be understood that instead of a cylindrical record a flat record or disk may be used and particu-
 110 larly in conjunction with the stylus shown in Figs. 3 to 8, inclusive.

It will be observed that an important feature of the construction herewith shown is that of being able to maintain the dia-
 115 phragm in horizontal position and the stylus itself is parallel with the diaphragm and in one form the greater part of its length is substantially horizontal while in the other form its entire length is always in horizontal
 120 plane. This arrangement has obvious advantages in comparison with the apparatus in which the diaphragm has to be maintained in vertical position or at an angle to the horizontal.
 125

Having thus described my invention what I claim and desire to secure by Letters Patent is:—

1. In a sound recording and reproducing apparatus, the combination of a diaphragm, 130

a stylus rocking on its axis and connected with and actuated by said diaphragm so as to rock it on its axis, the point of the stylus being substantially in line with the stylus.

5 2. In a sound recording and reproducing apparatus, the combination of a diaphragm, a stylus rocking on its axis and connected with and actuated by said diaphragm so as to rock it on its axis, the point of the stylus
10 being substantially in line with the stylus, and adapted to move laterally as well as toward and away from the record and to vary the groove accordingly.

3. In a sound recording and reproducing
15 apparatus, the combination of a diaphragm, a stylus rocking on its axis and a lateral projection on said stylus connected with and actuated by said diaphragm so as to rock it on its axis, the point of the stylus being sub-
20 stantially in line with the stylus.

4. In a sound recording and reproducing apparatus, the combination of a diaphragm, a stylus rocking on its axis and connected with and actuated by said diaphragm so as
25 to rock it on its axis, the point of said stylus being beveled or truncated obliquely to the axis on which it rocks.

5. In a sound recording and reproducing apparatus, the combination of a diaphragm,
30 a stylus rocking on its axis and connected with and actuated by said diaphragm so as

to rock it on its axis, the point of the stylus being substantially in line with the stylus, an adjustable weight connected with said stylus and tending to keep it in normal position. 35

6. In a sound recording and reproducing apparatus, the combination of a diaphragm, a substantially straight stylus having the point thereof cut obliquely to the axis to form the cutting point and adapted to rock
40 on its axis, connections between the said diaphragm and stylus for rocking the latter in response to the movement of the diaphragm.

7. In a sound recording and reproducing apparatus, the combination of a diaphragm,
45 a substantially straight stylus having the point thereof cut obliquely to the axis to form the cutting point and adapted to rock on its axis, connections between the said diaphragm and stylus for rocking the latter in
50 response to the movement of the diaphragm, a bearing in which the inner end of said stylus is mounted, and a second bearing intermediate the ends of the stylus, in which it is adapted to rock. 55

In testimony whereof, I have hereunto set my hand in the presence of the two subscribing witnesses.

MORRIS SCHWARTZ.

Witnesses:

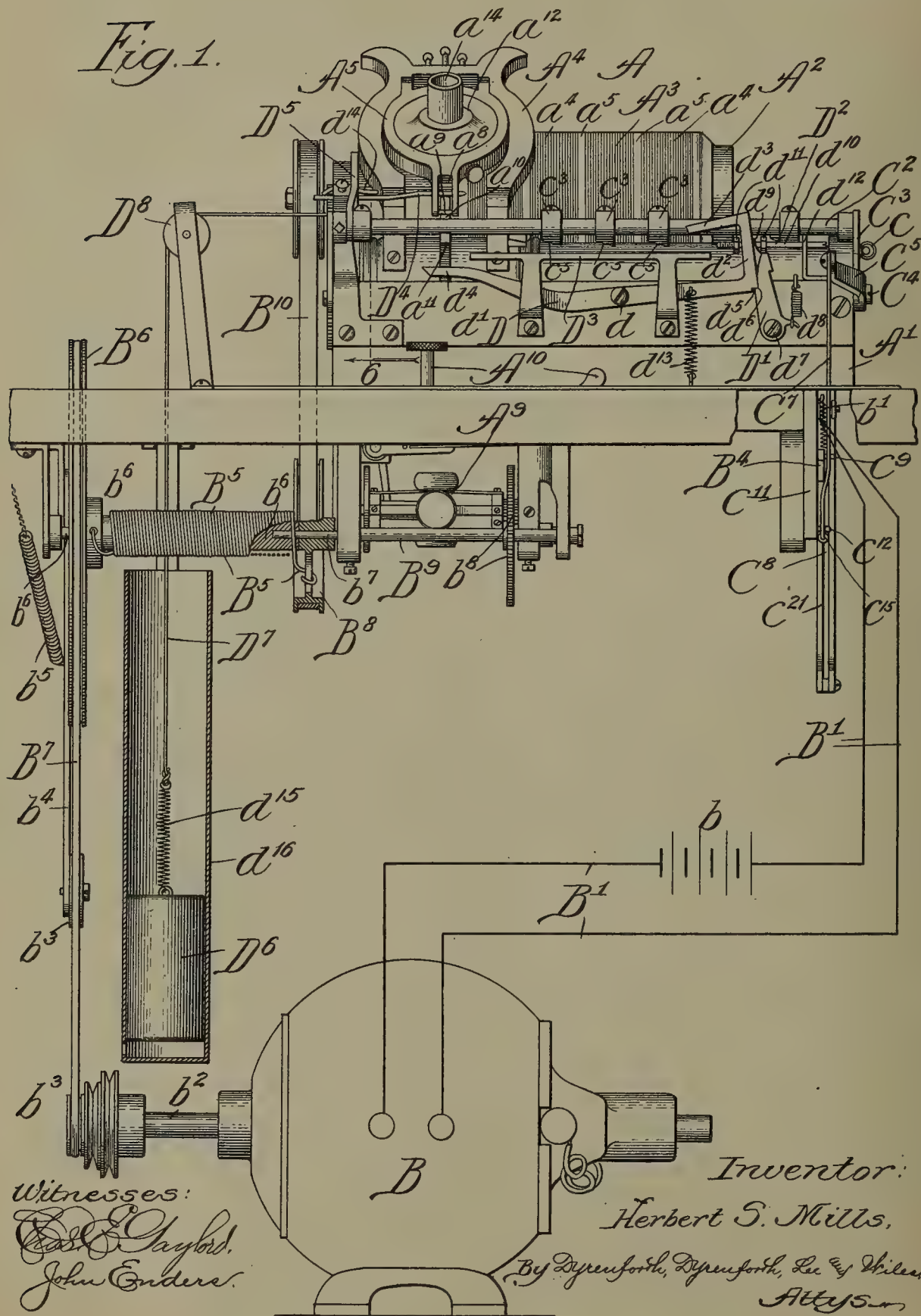
SOLOMON FLAUM,
WILLIS FOWLER.

H. S. MILLS.

PHONOGRAPH AND OTHER SOUND PRODUCING MACHINE.

APPLICATION FILED JAN. 17, 1907.

5 SHEETS—SHEET 1.



No. 876,006.

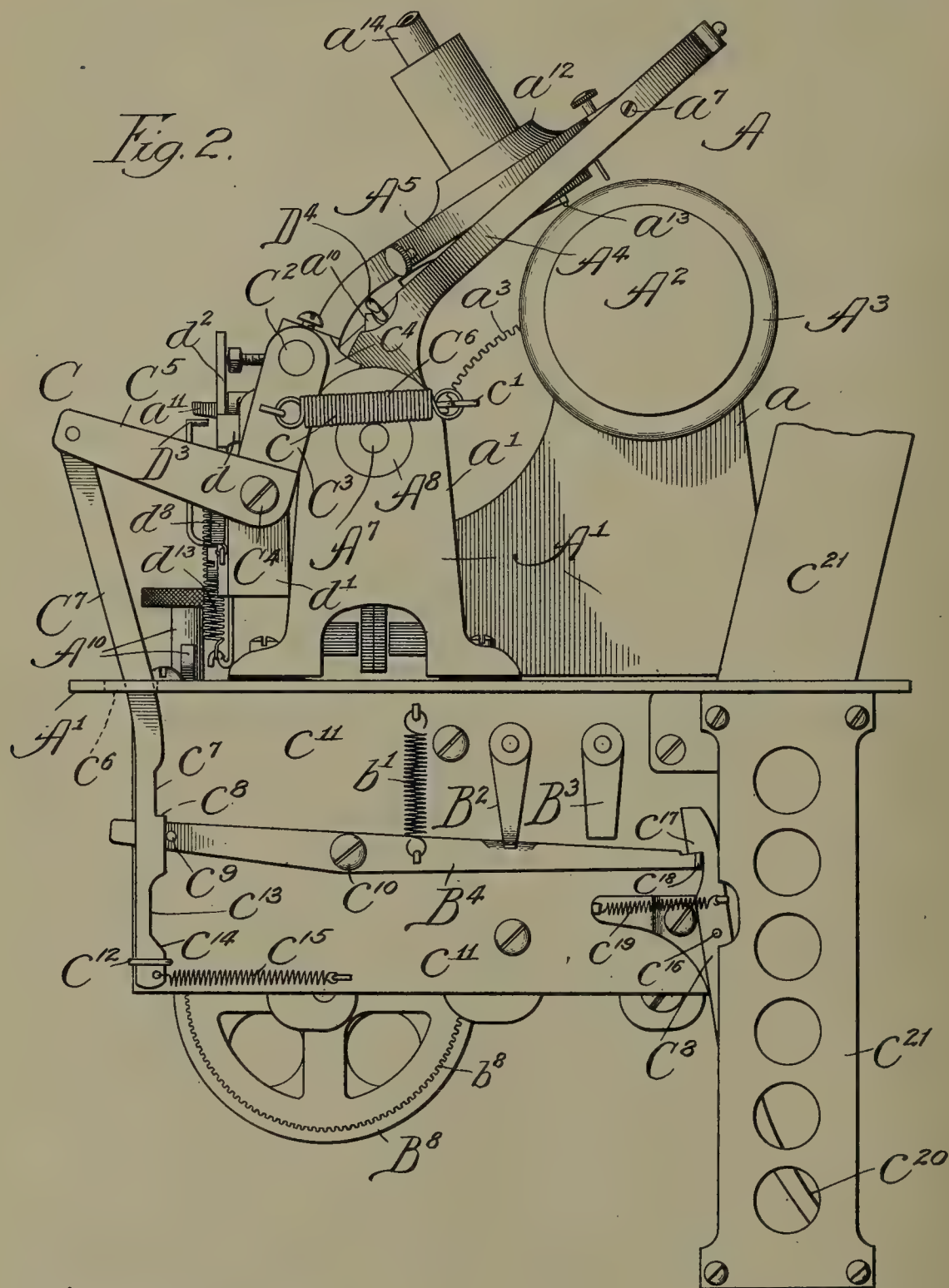
PATENTED JAN. 7, 1908.

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PHONOGRAPH AND OTHER SOUND PRODUCING MACHINE.

APPLICATION FILED JAN. 17, 1907.

5 SHEETS—SHEET 2.



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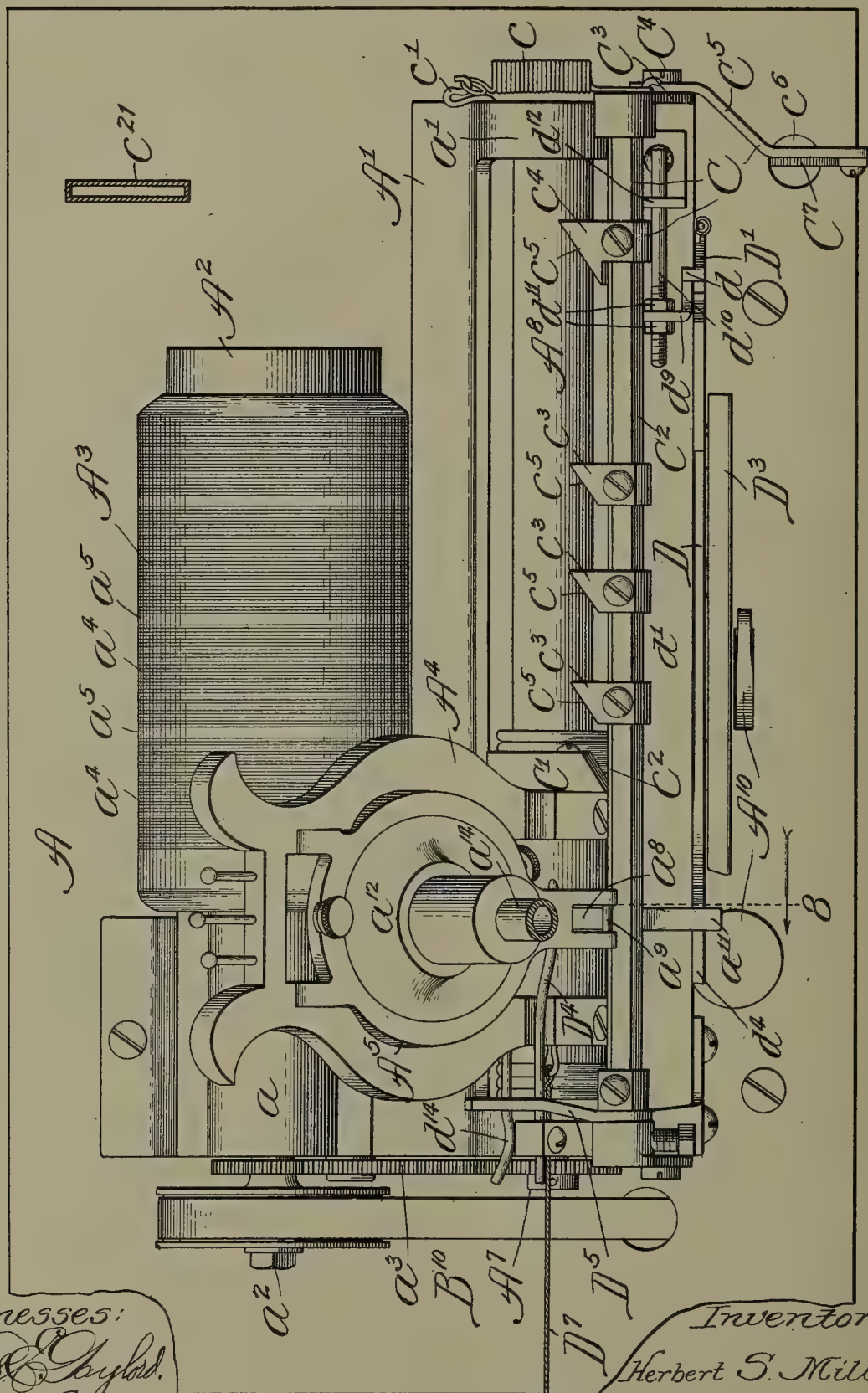
H. S. MILLS.

PHONOGRAPH AND OTHER SOUND PRODUCING MACHINE.

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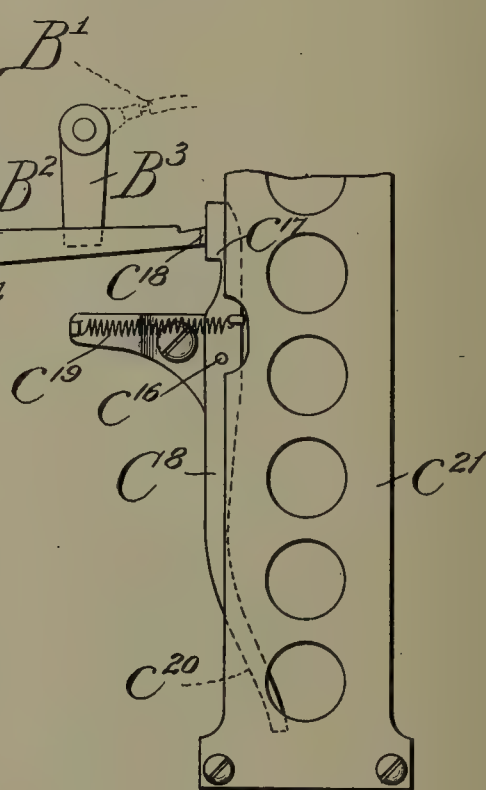
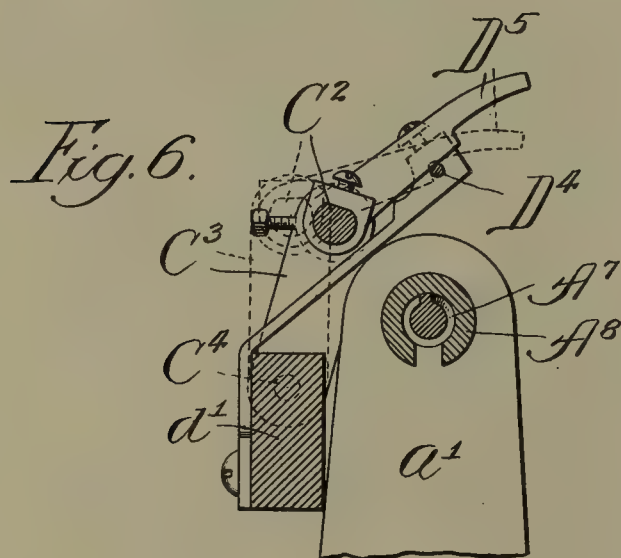
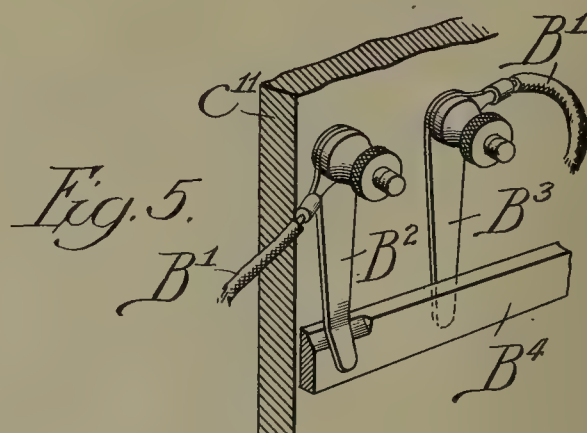
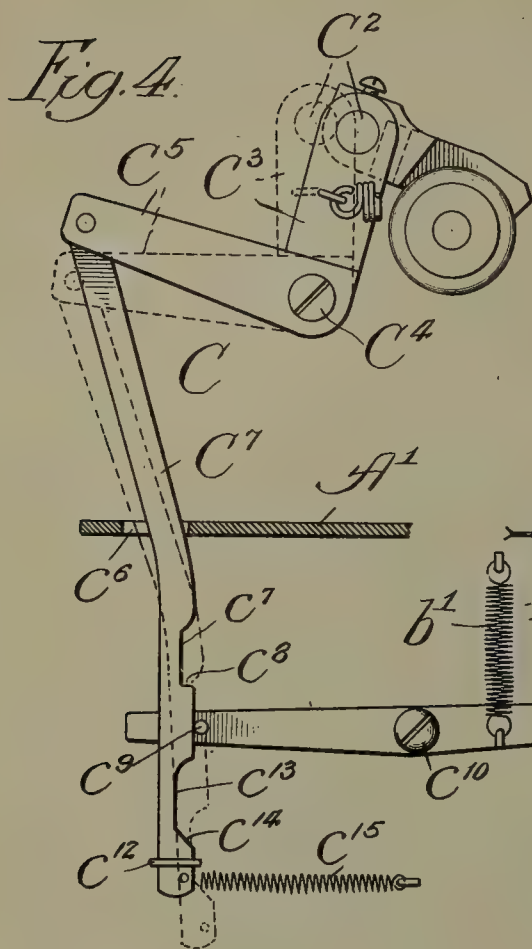
5 SHEETS—SHEET 3.

Fig. 3.



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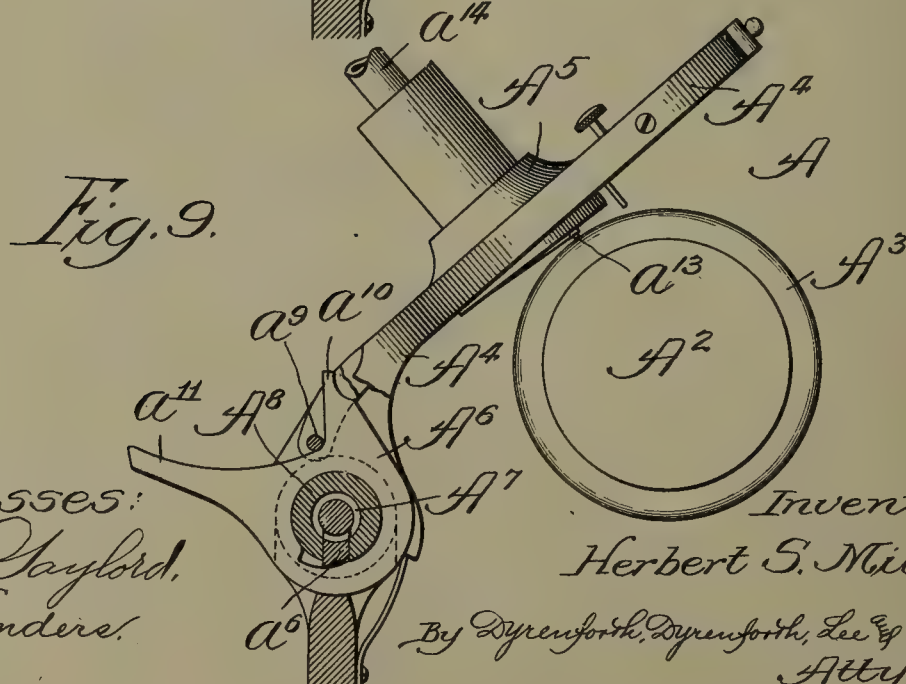
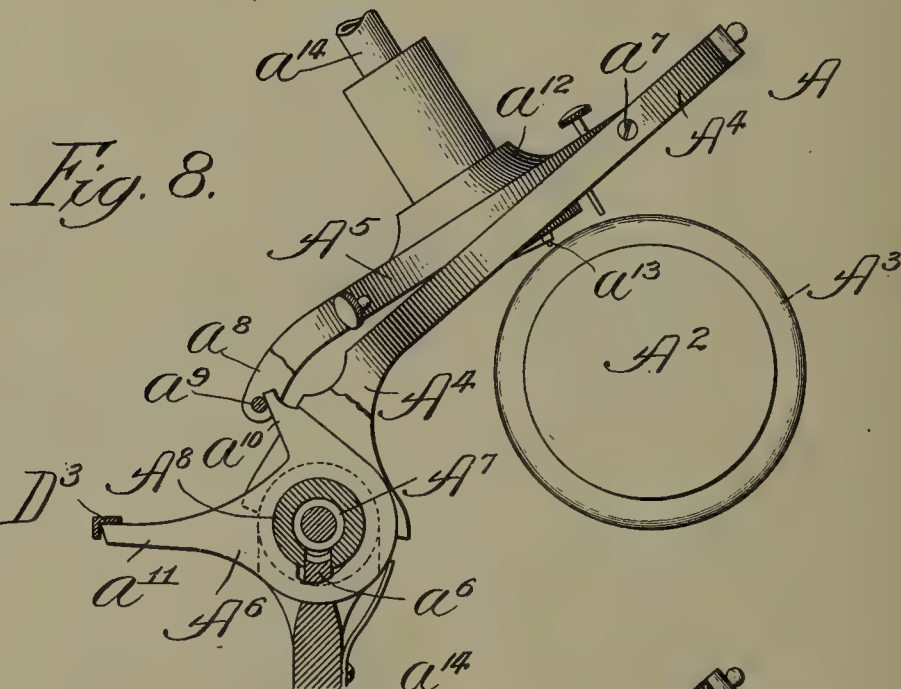
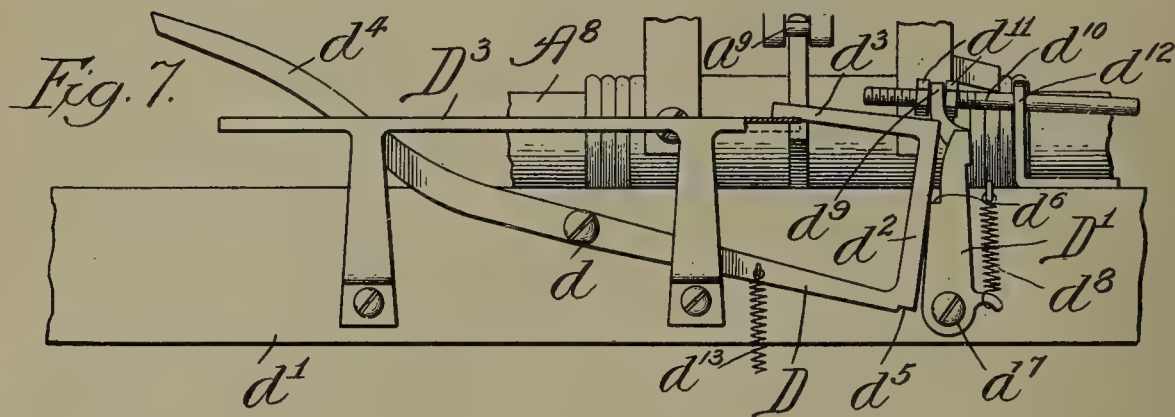
PATENTED JAN. 7, 1908.

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APPLICATION FILED JAN. 17, 1907.

5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

HERBERT S. MILLS, OF CHICAGO, ILLINOIS.

PHONOGRAPH AND OTHER SOUND-PRODUCING MACHINE.

No. 876,006.

Specification of Letters Patent.

Patented Jan. 7, 1908.

Application filed January 17, 1907. Serial No. 352,672.

To all whom it may concern:

Be it known that I, HERBERT S. MILLS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Phonograph and other Sound-Producing Machines, of which the following is a specification.

My invention relates particularly to motor-operated sound-reproducing machines, although the invention or certain features thereof may be usefully employed in sound-producing machines generally.

My primary object is to provide simple and efficient means for minimizing the ill effects resulting from variations or fluctuations in speed of the operating motor, such, for instance, as may result from fluctuations in an electric current, where an electric motor is employed for operating the sound-producing instrument. In musical instruments, such, for instance, as a phonograph employed for reproducing music, the matter of speed regulation in the operation of the instrument is exceedingly important, since fluctuations in the speed of the record of a phonograph will result in relative changes of pitch with consequent loss of harmony of tone.

A further object of my invention is to provide means whereby a phonograph may be caused to operate two or more times before the technically so-called reproducer thereof completely traverses the record-bearing member and whereby the reproducer will finally, after completely traversing the records, be returned automatically to its original or starting position.

In the preferred embodiment of my invention as applied to phonographs, I employ in connection with a phonograph an electric motor provided with a controlling-circuit; a power-transmission torsion spring interposed between the motor and the phonograph-record which it actuates and serving to dissipate the variations in speed and transmit a substantially unfluctuating speed of rotation to the phonograph record; means whereby the controlling circuit of the motor may be interrupted when the reproducer has reached any desired intermediate point in its traverse over the record, without the return of the reproducer to its starting position; and means whereby the circuit is interrupted after the reproducer has completed its traverse across the record and the reproducer

is then returned automatically to its original or starting position.

The invention is illustrated in the accompanying drawings as applied to a coin-controlled motor-actuated phonograph.

In the drawings—Figure 1 represents a broken front elevational view of a phonograph, equipped, operated and controlled in accordance with my invention; Fig. 2, an end elevational view of the same with the motor omitted; Fig. 3, a plan view of the same; Fig. 4, a view of circuit-controlling mechanism employed and taken in the same direction as the view shown in Fig. 2, the switch-lever being in a different position from its position shown in Fig. 2; Fig. 5, a sectional view in perspective, the section being taken as indicated at line 5 of Fig. 4, showing the relation of the switch to the contact points; Fig. 6, a detail section taken as indicated at line 6 of Fig. 1 and illustrating the manner in which a shiftable cam-equipped bar employed for actuating the switch of the circuit-controlling mechanism is held in a retracted position to permit the return of the reproducer-carriage without the cam carried thereby encountering the cams on said cam-shaft; Fig. 7, a front elevational view of certain parts and showing the position of said parts an instant after the retaining pawl or latch of the reproducer-elevating lever has been tripped; and Figs. 8 and 9, sections taken as indicated at line 8 of Fig. 3 and showing, respectively, the non-engaging and engaging positions of the reproducer-carriage with relation to the feed-screw which actuates said carriage during the reproducing operation.

In the construction illustrated, A represents a phonograph comprising the usual parts, namely, a frame A¹, record-carrier A² fitted with a cylindrical record A³, reproducer-carrier A⁴ bearing a pivoted needle-holder A⁵ and equipped with a screw-clutch or follower A⁶, reproducer-carrier feed-screw A⁷ contained within the reproducer-carrier guide A⁸ and geared to the shaft of the record-carrier A², governor A⁹, and brake device A¹⁰; B, an electric motor having a circuit B¹ fitted with switch-points B² and B³ and with a switch B⁴, as shown in Figs. 2, 4 and 5; B⁵, a shock-absorbing power-transmission torsion-spring actuated by a wheel B⁶ connected by a belt B⁷ to the motor-shaft; B⁸, a wheel attached to and actuated by the power-

transmission spring B^5 and serving to actuate a shaft B^9 upon which it is fixed and also to transmit motion through a belt B^{10} to the record-carrier shaft; C, circuit-controlling mechanism actuated by the reproducer and comprising a cam C^1 carried by the reproducer-carrier, a shiftable cam-equipped switch-actuating bar C^2 extending parallel with and located in front of the reproducer-carrier guide, a pair of arms C^3 supporting said bar and supported on pivots C^4 , one of said arms constituting with an arm C^5 a bell-crank lever, a spring C^6 which tends to hold the bar C^2 in the position in which it is shown in Fig. 2, and a switch-actuating link C^7 depending from the free end of the arm C^5 of said bell-crank lever; C^8 , a switch-locking lever which normally locks the switch-lever B^4 in the open position indicated in Fig. 2; D, a needle-elevating and clutch-disengaging lever which serves, by rotating the member A^6 to disengage the clutch from the feed-screw and swing the holder A^5 to the position shown in Fig. 8; D^1 , a latch, or pawl, which serves to lock the lever D in the position shown in Fig. 1; D^2 , a latch-unlocking member actuated by the member A^6 when the reproducer-carrier reaches the end of its traverse; D^3 , a cam which serves to hold the clutch-member A^6 in the disengaged position shown in Fig. 8 during the return movement of the reproducer-carrier; D^4 , a needle-holder support upon which the holder A^5 rides as the reproducer-carrier, in its return movement, nears its original starting position; D^5 , a bar-latch which serves, by engagement with the member D^4 , as indicated by dotted lines in Fig. 6, to lock the cam-equipped bar C^2 in its forward, or retracted, position to permit the cam C^1 on the reproducer-carrier to pass the cams on the bar C^2 during the return movement of the reproducer-carrier; and D^6 , a carrier-retracting weight supported by a cord D^7 which passes over a pulley D^8 and is attached to the reproducer-carrier.

The general construction of the phonograph illustrated is well understood, and it will be unnecessary to go into details, except as may be necessary to enable the description of the novel features which have been added to be understood. The frame A^1 has the usual standard for supporting the rotary record-carrier, and the usual standards a^1 in which the reproducer guide is mounted and the feed-screw journaled. Motion is communicated from the shaft a^2 of the record-carrier, by a train of gears a^3 to the feed screw A^7 . The record A^3 is the usual cylindrical wax record, and as here illustrated the record cylinder has its surface divided into a plurality of records a^4 separated by unmarked spaces a^5 , whereby a series of records may be reproduced during one complete traverse of the record cylinder

by the reproducer. The circuit-controlling mechanism is so arranged as to stop the motor automatically after each short record a^4 has been reproduced. This feature is of great importance in machines known as "fortune-telling machines," or, generally, when the record cylinder is of sufficient size to contain several records. The reproducer-carrier A^4 is pivotally and slidably mounted on the guide A^8 in the usual manner, the member A^8 being slotted on its lower side to permit the screw-engaging member a^6 to engage the screw. The needle-holder A^5 is pivotally supported in the carriage A^4 on pivots a^7 . The lower front portion of the member A^5 is provided with bifurcations, or arms, a^8 joined by a pin a^9 . The member A^6 has a short arm a^{10} located between the bifurcations a^8 of the member A^5 and adapted to engage the pin a^9 ; and said member A^6 has a longer arm a^{11} adapted to be engaged by the lever D for the purpose of raising the member A^5 to withdraw the needle from the record, as shown in Fig. 8, and said arm a^{11} is adapted to pass beneath the cam D^3 and hold the member A^5 in an elevated position during the return movement of the reproducer-carrier. It will be observed, also, that when the member A^6 is in the position shown in Fig. 8, the carrier is released from the feed-screw. The holder A^5 supports a disk a^{12} by which the needle or tracer a^{13} is carried, and the disk a^{12} also supports the tube a^{14} which connects with the ear trumpets (not shown).

The motor employed for operating the machine is preferably an electric motor, designated B. This motor may be of any approved type and any suitable circuit-controlling means may be employed. Ordinarily machines of this character are intended for operation by a current supplied from a dynamo which serves, at the same time, for various operative purposes. The current, therefore, is subject to fluctuation, and I have provided means for overcoming the ill effects of such fluctuations, which are peculiarly felt in machines adapted for the purpose of the present machine. I have shown the circuit B^1 equipped with a battery b , but this is merely for illustration. Ordinarily, the use of batteries is avoided, where possible, for reasons which will be understood by those skilled in the art.

By reference to Figs. 4 and 5 it will be seen that the circuit B^1 will be completed when the right-hand end of the switch-lever B^4 is in the elevated position shown in these figures. The switch-lever is equipped with a spring b^1 which tends to bring about this condition. The shaft b^2 of the motor is equipped with a stepped pulley b^3 for connection with the belt B^7 . The belt in passing to the pulley B^6 passes over an idler b^3 carried by an arm b^4 which is acted upon by

a spring b^5 . The wheel B^6 has its hub fixed on a shaft b^6 which extends through the coiled spring B^5 , abuts loosely against the hub of the wheel B^8 , and has a bore in its end receiving the adjacent end of the shaft B^9 . One end of the spring B^5 is attached to a spoke of the wheel B^8 , so that the spring serves to actuate the wheel B^8 . The shaft B^9 is connected by gears b^8 with the governor A^9 of the phonograph, said governor being of the usual construction.

The circuit-controlling mechanism C serves to automatically break the circuit after the motor has operated for a predetermined period. As shown in Figs. 2 and 3, one of the arms C^2 is connected by a spring c with a hook c^1 connected with an end standard a^1 of the phonograph frame. This spring tends to hold the cam-equipped bar C^2 in the position shown in Figs. 2 and 3. The cam C^1 attached to the reproducer-carrier A^4 is provided with an oblique or beveled surface c^2 ; and the bar C^2 is equipped with a series of intermediate cams c^3 and an end-cam c^4 , these cams having oblique or beveled surfaces c^5 coacting with the oblique surface c^2 of the cam C^1 . The spacing of the intermediate cams corresponds with the spacing of the several records or paragraphs on the record cylinder, so that the bar C^2 will be actuated to cause an interruption of the motor circuit after the reproduction of each record of the record cylinder. The cam c^4 is longer than the cam c^3 , that is, projects rearwardly farther than the cam c^3 , so that when the cam c^4 is encountered the bar C^2 will be moved forward through a greater distance than when the cams c^3 are encountered, thereby permitting the latch D^5 to assume the locking position with reference to the member D^4 , which is illustrated in dotted lines in Fig. 6, whereby the cam-equipped bar C will be held in its forward position during the return movement of the reproducer-carrier, so that the cam C^1 will clear the cams of the bar C^2 .

The arm C^5 , which is rocked downwardly when the bar C^2 is thrown forwardly by the action of the reproducer-carrier, serves to depress the link C^7 during this action. Said link moves in a guide slot c^6 in the base-plate of the frame A^1 , and is provided beneath said base-plate with a slot or recess c^7 terminating at its lower end in an abrupt shoulder c^8 adapted to engage a stud c^9 on the front end of the switch lever B^4 . Said switch lever is supported on a pivot c^{19} carried by a frame-member c^{11} depending from said base-plate. The lower end of the link C^7 is confined in a guide c^{12} , and near the lower end of said link is a slot or recess c^{13} beneath which is a cam c^{14} adapted to work on the front wall of the guide c^{12} . Connected with the lower end of the link C^7 and with the frame member c^{11} is a spring c^{15} . When the link C^7 moves down-

wardly, the recess c^{13} permits the lower end of said link to be swung, under the action of the spring c^{15} , so that the abrupt shoulder c^8 will engage the stud c^9 of the switch lever. When the arm C^5 is suddenly drawn upwardly under the action of the spring c after a cam of the bar C^2 has been passed by the cam C^1 of the reproducer-carrier, the switch lever will be quickly actuated to interrupt the circuit of the motor; and during the final portion of the upward movement of the link C^7 the cam c^{14} serves to release the link from the stud c^9 , so that the parts will occupy the position shown in Fig. 2.

The latch lever C^8 is supported on a pivot c^{16} and is provided at its upper end with a locking shoulder c^{17} adapted to engage a lateral lug c^{18} on the rear end of the switch lever B^4 . A spring c^{19} tends to move the upper end of the lever C^8 towards the switch lever B^4 . The lever C^8 occupies substantially a vertical position, and has a rearwardly curved lower end c^{20} which projects into a coin-chute c^{21} . When the lower end of the latch lever c^{20} is swung forwardly, as will happen if a coin is dropped into the chute c^{21} , the latch will be disengaged from the locking position shown in Fig. 2, and permit the spring b^1 to elevate the rear end of the switch lever and complete the electric circuit, as shown in Fig. 4. This position of the switch lever will be maintained until the link C^7 is again depressed and elevated to actuate the switch lever and break the circuit.

The lever D which serves to elevate the needle holder of the reproducer and to disengage the reproducer-carrier from the feed-screw is supported on a pivot d carried by a frame-member d^1 . The lever lies in a plane parallel with the plane of the cam bar C^2 ; and, as shown in Figs. 1 and 7, has at its right-hand end an upwardly extending arm d^2 which is equipped with an arm d^3 which extends from the arm d^2 towards the left-hand end of the machine. The left-hand end of the lever D is curved upwardly and to the left, as indicated at d^4 . At the right-hand end of the lever D and at the base of the standing arm d^2 is a locking shoulder d^5 which serves to engage a locking shoulder d^6 with which the pawl D^1 is provided. Said pawl D^1 is supported on a pivot d^7 and is normally held in engagement with the lever D by a spring d^8 . The upper end of the pawl D^1 is provided with a perforate ear d^9 which receives a short threaded rod d^{10} equipped with adjustable nuts d^{11} . The rod d^{10} moves in a guide d^{12} . The left hand end of the member d^{10} is in the path of the arm a^{11} of the member A^6 of the reproducer, so that when the reproducer-carrier reaches the final end of its traverse, the pawl D^1 will be actuated to release the lever D and permit the spring d^{13} of said lever to depress the right-

hand end of the lever, the arm a^{11} of the member A^6 passing, in the meantime, beneath the arm d^3 of the lever D , so that when the lever D is actuated by its spring, the member A^6 will be rotated to release the reproducer-carrier from the feed-screw and at the same time raise the needle-holder A^5 to withdraw the needle from the record. The instant this occurs, the weight D^6 operates to retract the reproducer-carrier, the arm a^{11} of the member A^6 passing from beneath the arm d^3 of the lever D beneath the cam D^3 , so that the reproducer-carrier will be held out of engagement with the feed-screw and the needle-holder will be held elevated during the return movement of the reproducer-carrier. During the return movement of the reproducer-carrier, the arm a^{11} will encounter the cam portion d^4 of the lever D and restore the lever D to its normal position. Before the arm a^{11} passes from beneath the left-hand end of the cam D^3 , the stud D^4 will be received beneath the arms a^8 of the needle-holder so as to support said needle-holder for an instant at the beginning of the next operation of the machine. In the meantime because of the loose connection between the short arm a^{10} and the needle-holder A^5 , the member A^6 will return to its normal position, thereby connecting the reproducer-carrier again with the feed-screw. An instant after the machine is again set in operation, the needle-holder will drop off the support D^4 and bring the needle again into contact with the record. Inasmuch as the cam bar C^2 is held in a retracted position by the latch D^5 during the return movement of the reproducer-carrier, it is necessary to provide means for releasing the latch from the member D^4 to permit the bar C^2 to assume its normal position. For this purpose the reproducer-carrier is equipped with a cam d^{14} which engages the free end of the pawl D^5 when the reproducer-carrier reaches the left-hand end of its traverse and disengages the pawl from the member D^4 . The cam d^{14} is shown as a short curved wire projecting to the left from the carrier A^4 , as shown in Fig. 3. The pawl B^5 is pivoted on the left-hand end of the bar or shaft C^2 , as shown in Figs. 1 and 3.

I preferably connect the cord D^7 with the weight D^6 through the medium of a spring d^{15} , and confine the weight in a guide-cylinder d^{16} in which a certain amount of air cushioning occurs, the whole arrangement being intended to prevent shock to the delicate parts of the mechanism.

From the foregoing description, the operation will be readily understood. When it is desired to operate the phonograph, the lower end of the latch-lever c^{20} is swung forwardly, as by dropping a coin into the chute c^{21} , thereby unlatching the switch-lever B^4 , whose spring b' thereupon operates to ele-

vate the rear end of the switch-lever and make connection between the switch-points B^2 , B^3 , thereby establishing the circuit of the electric motor. Thereupon, the motor, through the medium of the wheel B^6 , rotates the power-transmission coil-spring B^5 , thereby communicating motion to the wheel B^8 , and thence through the shaft B^9 to the governor A^9 , and through the belt B^{10} to the record-carrier, and from the record-carrier through the gear train a^3 to the feed-screw which actuates the reproducer-carrier. A moment after the reproducer-carrier starts to the right from the position shown in Fig. 1, the needle-support A^5 drops off the supporting member D^4 , allowing the needle to come into contact with the cylinder. During the movement of the reproducer to the right, the arm a^{11} of the member A^6 travels above the cam D^3 . When the cam C^1 encounters the first cam c^3 on the bar C^2 , the bar C^2 is shifted forwardly a sufficient distance to depress the link C^7 so that it will engage the stud c^9 . After the cam C^1 passes the first of the cams c^3 , the bar C^2 is suddenly returned under the action of the spring c , thereby elevating the bar C^7 and breaking the circuit. This action, it is noteworthy, is accomplished without the release of the reproducer-carrier from the feed-screw, and the movement of the bar C^2 is not sufficient to permit the pawl D^5 to lockingly engage the member D^4 so as to hold the bar C^2 in its forward position. The only effect, therefore, is to interrupt the circuit and stop the motor. The circuit may be reestablished by again actuating the lever c^{20} to release the switch-lever. The action just described is repeated when any one of the intermediate cams c^3 of the bar C^2 is encountered and passed by the cam C^1 of the reproducer-carrier. When the cam C^1 encounters the cam c^4 of the bar C^2 , the bar C^2 is shifted a greater distance, and the pawl D^5 is permitted to assume the locking position indicated by the dotted lines in Fig. 6. This is accomplished an instant before the arm a^{11} of the member A^6 of the reproducer-carrier encounters the member d^{10} and through the medium thereof actuates the pawl D^1 to release the needle-elevating lever D . When the lever D is released, it operates to turn the member A^6 on its pivot, elevate the needle-holder and release the reproducer-carrier from the feed-screw, the weight D^6 then operating to return the reproducer-carrier to its starting position. During this return movement, the arm a^{11} passes beneath the cam D^3 , maintaining the disconnection between the reproducer-carrier and the feed-screw and holding the needle away from the record. In the return movement, the arm a^{11} encounters the cam d^4 and restores the lever D to its original position. An instant before the arm a^{11} passes from beneath the left-hand end of the

cam D^3 , the supporting member D^4 is received beneath the arms a^8 of the member A^5 , and an instant later the cam d^{14} encounters the free end of the pawl D^5 and releases the cam-bar C^2 , permitting it to assume its normal position. It is noteworthy that the lever D aids in restoring the member A^6 to the position in which connection with the feed-screw is made at the instant that the arm a^{11} passes from beneath the left-hand end of the cam D^3 .

The foregoing detailed description has been given for clearness of understanding only, and no undue limitation is to be understood therefrom. It may be stated that the power-transmission spring B^5 may be of any suitable length and strength to enable it to successfully perform its function under varying conditions. It is noted that while the spring rotates bodily during the transmission of power, it also yields throughout its length, when fluctuations in speed of the electric motor occur; and, owing to the resilience of the spring, the operation of the phonograph is continued in an even manner, regardless of said fluctuations.

In practice, the governor tends to retard the operation of the machine in a greater or lesser degree, depending upon the speed transmitted to the governor, thereby tending to uniformity of movement of the record and reproducer of the phonograph. This action of the governor is supplemented by the resilience of the spring B^5 , which introduces a steadying effect which no governor is delicate enough and quickly responsive enough to effect; and it is to be observed, there is also possibility of slippage of the belt B^7 upon its pulleys, which further supplements said action, so that there are three factors tending to uniformity of movement of the record and reproducer. As a matter of practice, there always is employed an electric motor capable of developing, on the weakest current supplied by the circuit, a speed in excess of that transmitted to the wheel B^6 , so that there always is more or less slippage of the belt B^7 .

It is noteworthy that my invention enables the use of storage-batteries to be dispensed with as a source of power for automatic phonograph-machines, without necessitating the use of an automatically rewound spring-motor between the electric motor and the phonograph. In other words, I am enabled, by my invention, to take the power directly from an electric-motor operated from a line current and obtain the most satisfactory results from the standpoint of reproduction of music, while at the same time eliminating expensive mechanism and rendering the machine more simple, more durable, and easier of operation and maintenance, besides greatly reducing the cost of the machine. The great importance of these results will at once be

appreciated by all persons experienced in the art.

What I regard as new, and desire to secure by Letters Patent, is—

1. The combination with a movable sound-producing member of a sound-producing machine, of an electric motor operating continuously during the reproducing operation, a member driven by said motor, a power transmission spring connected to said driven member, and means connecting said spring to said sound producing member whereby said sound-producing member is driven by said motor through said spring, and the variations in the speed of the motor is absorbed by the spring, so that the sound-producing member is moved at a constant speed.

2. The combination with a phonograph, of an electric motor, a power transmission spring serving to actuate an operative part of said phonograph, means for transmitting power from said electric motor to said power transmission spring capable of slippage when the pull from the motor exceeds a predetermined maximum.

3. The combination with a phonograph, of an electric motor, a power transmission spring serving to actuate an operative part of said phonograph, and belt and pulley connections between said electric motor and said transmission spring.

4. The combination with a phonograph and an electric motor operating continuously during the operation of the phonograph and serving as a source of power therefor, of power-transmitting and motion regulating means for the phonograph, comprising a governor, and a resilient transmission spring rotated by the electric motor and transmitting power therefrom to the phonograph.

5. The combination with a phonograph and an electric motor serving as a source of power therefor, of power transmission and motion regulating means comprising a governor, a power transmission spring serving to actuate the phonograph and governor, and friction transmission means between said power transmission spring and said electric motor permitting acceleration of the speed of the motor without undue acceleration of the speed of the power transmission spring.

6. The combination with a phonograph having a record-carrier and reproducer-carrier, of an electric motor having a circuit, a power-transmission spring, means for transmitting power from said motor to said power transmission spring, said means being capable of slippage when the pull from the motor exceeds a predetermined maximum, means for transmitting motion from said power-transmission spring to said record-carrier and reproducer-carrier during operation of said motor and rotation of said spring, and automatic circuit-controlling means.

7. The combination with a phonograph having a record-carrier and a reproducer carrier, of an electric motor having a circuit, a power-transmission spring, means for transmitting power from said motor to said power-transmission spring, said means being capable of slippage when the pull from the motor exceeds a predetermined maximum, means for transmitting motion from said power-transmission spring to said record-carrier and reproducer-carrier during operation of said motor and rotation of said spring, a governor for the phonograph, and automatic circuit-controlling means.
8. The combination with a phonograph having a record carrier and reproducer carrier, of an electric motor having a circuit, a power transmission spring, pulley and belt connection between the electric motor and said transmission spring, means for transmitting motion from said power transmission spring to said record-carrier and reproducer-carrier during operation of said motor and rotation of said spring, and automatic circuit controlling means.
9. The combination with a phonograph having a record-carrier and a reproducer-carrier, of an electric motor having a circuit, a wheel actuated by said electric motor and having a power-transmission coil-spring actuated thereby; a wheel actuated by said coil-spring, means for transmitting motion from said second-named wheel to the record-carrier and from the record-carrier to the reproducer-carrier, a governor for the phonograph, means for transmitting motion from said second-named wheel to said governor, and circuit-controlling means actuated by the reproducer-carrier.
10. The combination with a phonograph having a record-carrier and reproducer-carrier, of an electric motor serving to operate the phonograph, said motor having a circuit, circuit-controlling means operative to interrupt the circuit a plurality of times during one complete traverse of the reproducer-carrier, and means for automatically returning the reproducer-carrier to its starting position after it has completed its traverse.
11. The combination with a phonograph having a record-carrier and reproducer-carrier, of an electric motor serving to operate the phonograph, said motor having a circuit, circuit-controlling means comprising a switch-actuating cam-equipped member, and a co-operating cam on the reproducer-carrier.
12. The combination with a phonograph having a record-carrier and reproducer-carrier, of an electric motor serving to operate the phonograph, said motor having a circuit, circuit - controlling means comprising a switch-actuating member equipped with a plurality of cams, and a cam carried by the reproducer-carrier and coöperating with said first-named cams.
13. The combination with a phonograph having a record-carrier and a reproducer-carrier, of a motor having a circuit, and a circuit-controlling means comprising a shiftable switch-actuating member equipped with a plurality of cams, one of said cams projecting farther than the others, and a cam carried by the reproducer-carrier and co-acting with said first-named cams.
14. The combination of a phonograph having a record-carrier and reproducer-carrier, a feed-screw, releasable means connecting the reproducer-carrier with said feed-screw, a motor having a circuit, a switch-actuating member equipped with a plurality of cams, one of said cams projecting farther than the others, a cam on the reproducer-carrier co-acting with said first-named cams, means for locking said first-named cam-equipped member in a retracted position to permit return of the reproducer-carrier, and means for raising the reproducer-needle and returning the reproducer-carrier to its original position.
15. The combination with a phonograph having a record-carrier and a reproducer-carrier, of a feed-screw for the reproducer-carrier, releasable connecting means between the reproducer-carrier and said feed-screw, a motor having a circuit, circuit-controlling means comprising a switch-actuating member equipped with a cam, a cam carried by the reproducer-carrier co-acting with said first-named cam, and means for raising the needle-holder of the reproducer and maintaining it in a raised position during the return movement of the reproducer-carrier.
16. In mechanism of the character described, the combination with the reproducer of a phonograph and a feed-screw therefor, of releasable connecting means between the reproducer-carrier and said feed-screw, a shiftable bar equipped with a plurality of cams, a cam carried by the reproducer-carrier, a circuit-controlling switch actuated by said shiftable bar, a lever serving to raise the needle-holder of the reproducer and disengage the reproducer-carrier from its feed-screw, and means for returning the reproducer-carrier to its starting position.
17. In mechanism of the character described, the combination with the reproducer of a phonograph, and a feed-screw therefor, of a clutch-releasing and needle-holder elevating member, a motor having a circuit, circuit-controlling means actuated by the reproducer-carrier, a spring-actuated lever serving to operate said clutch-releasing member, a cam serving to hold said clutch-releasing member in the disengaged position during the return movement of the reproducer-carrier, and means for returning the reproducer-carrier to its starting position.
18. In mechanism of the character de-

scribed, the combination with the clutch-releasing member of the reproducer-carrier of a phonograph, of a spring-actuated lever having a member serving to engage said clutch-releasing member, and a cam beneath which said clutch-releasing member passes during the return movement of the reproducer-carrier.

19. In mechanism of the character described, the combination with the clutch-releasing member of the reproducer-carrier of a phonograph, of a pivoted spring-actuated lever having a member beneath which an arm of said clutch-releasing member is adapted to pass and having at its opposite end a cam-portion, a stationary cam beneath which the arm of the clutch-releasing member is adapted to pass during the return movement of the reproducer-carrier, a pawl normally holding said lever against the action of its spring, actuating means for said pawl operated by the reproducer-carrier, and means for returning the reproducer-carrier to its starting position.

20. The combination with the clutch-releasing member of the reproducer-carrier of a phonograph, of an actuating lever for the clutch releasing member which is mounted on the frame of the machine, a locking pawl serving normally to hold said lever in an inoperative position, and adjustable actuating means for said locking pawl actuated by the reproducer carrier.

21. The combination with the clutch releasing member of a reproducer-carrier of a phonograph, of a lever D having a member d^3 serving to engage an arm of the clutch-releasing member and having a cam-portion d^4 , a stationary cam D^3 adapted to engage the arm of the clutch-releasing member after said arm passes from beneath the member d^3 , and a locking pawl D^1 for said lever.

22. The combination with a phonograph having a record-carrier, a reproducer-carrier, a feed-screw and a clutch-releasing and needle-holder elevating member, of means for actuating the record-carrier and the feed-screw, a lever serving to actuate the clutch-releasing and needle-holder elevating member, a stationary cam serving to engage said member during the return movement of the reproducer-carrier, and a needle-holder support serving to engage the needle-holder as the reproducer-carrier nears its starting position.

23. The combination with a phonograph having a record carrier, a reproducer-carrier, a feed-screw, a needle-holder, and a clutch-releasing and needle-holder elevating member, of a motor having a circuit, a switch-actuating member equipped with a plurality of cams, one of said cams being of greater extent than the others, a locking pawl for said cam-equipped member, a cam carried by the reproducer-carrier, and means for releas-

ing said locking pawl when the reproducer-carrier returns to its original position, thereby permitting said cam-equipped member to assume its normal position.

24. The combination with a reproducer-carrier equipped with a cam, of a shiftable bar equipped with a plurality of cams, a bell-crank lever actuated by said bar, a switch-actuating link actuated by said bell-crank lever, and a switch-lever actuated by said link.

25. The combination with the reproducer-carrier of a phonograph, of a cam carried by said carrier, a shiftable bar equipped with a plurality of cams, a link actuated by said bar and provided with a shoulder, a switch-lever provided with a shoulder adapted to be engaged by said first-named shoulder, a spring serving to hold said cam-equipped bar in its normal position, a spring serving to actuate the switch-lever, and a latch-lever for the switch-lever.

26. The combination with the reproducer-carrier of a phonograph, of a cam carried thereby, a shiftable bar, a plurality of adjustable cams mounted on said bar, a switch-actuating link actuated by said bar, and a circuit-controlling switch actuated by said link.

27. The combination with a phonograph having a record-carrier, a reproducer-carrier, a feed-screw, and a clutch-releasing and needle-holder elevating member, of a cam carried by the reproducer-carrier, a bar extending parallel with the front of the machine in front of the reproducer-carrier, a cam on said bar, switch-operating means actuated by said bar, means for actuating the clutch-releasing member, and a cam for engaging the clutch-releasing member during the return movement of the reproducer-carrier.

28. The combination with the reproducer-carrier of a phonograph, of a cam mounted thereon, a cam-equipped member actuated by said cam, a link actuated thereby and provided with a shoulder and with a cam, a switch-lever having a shoulder adapted to engage said first-named shoulder, a spring serving to actuate said switch-lever, and a latch-lever for the switch-lever.

29. The combination with a phonograph having a record-carrier and reproducer-carrier, of a record-bearing member having a series of records on its surface, a motor, means for stopping the movement of the record-carrier and reproducer-carrier when the reproducer-carrier is at a point corresponding with a space between records, and means for stopping the record-carrier and returning the reproducer-carrier to its original starting position after the reproduction of the final record of the series.

30. The combination with a phonograph having a record-carrier, a reproducer-carrier,

a feed-screw and a clutch-releasing member, of a record-bearing member having a series of records on its surface, an electric motor having a circuit, a circuit-controlling switch,
5 a cam carried by the reproducer-carrier, a switch-actuating member having a plurality of cams, the last one of which is of greater size than the others, trip-mechanism actuated by the reproducer-carrier at the final
10 end of its traverse and serving to actuate the

clutch-releasing member, means for locking the switch-actuating member in a retracted position, and means carried by the reproducer-carrier for releasing said switch-actuating member when the reproducer-carrier 15 returns to its original starting position.

HERBERT S. MILLS.

In presence of:

FRANK S. WILDER,

J. S. RYAN.

W. W. YOUNG.

SOUND REPRODUCING AND MODIFYING DEVICE.

APPLICATION FILED JAN. 10, 1906.

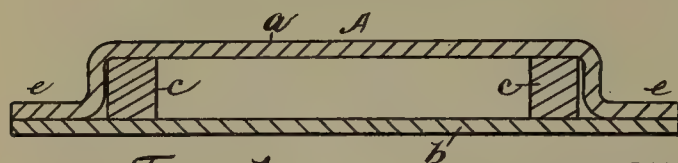


Fig. 1

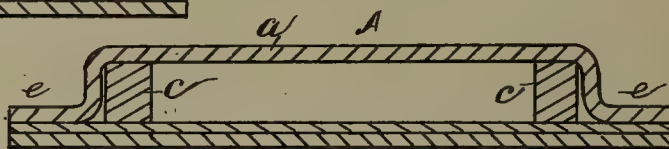


Fig. 2

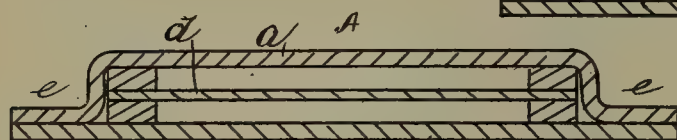


Fig. 3

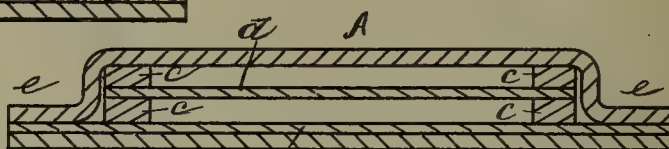


Fig. 4

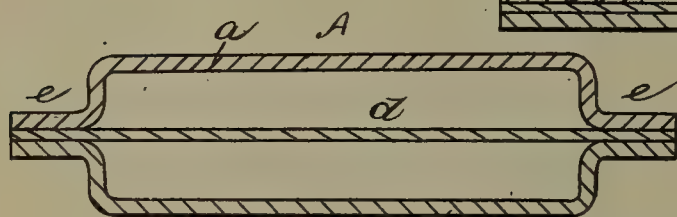


Fig. 5

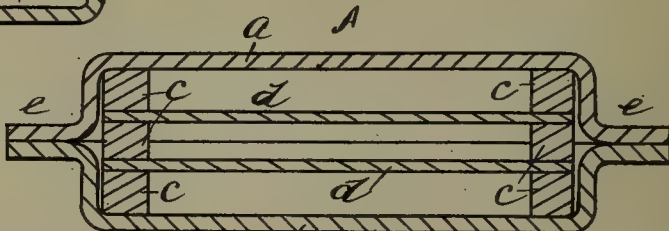


Fig. 6

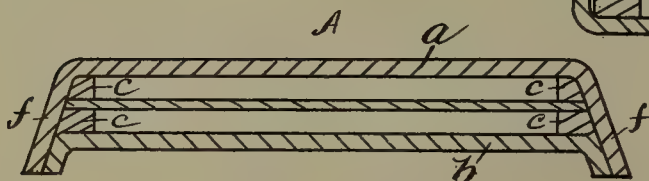


Fig. 7

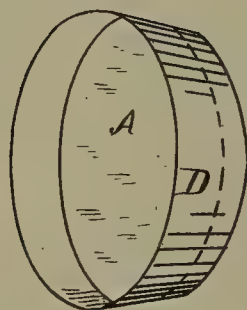


Fig. 8

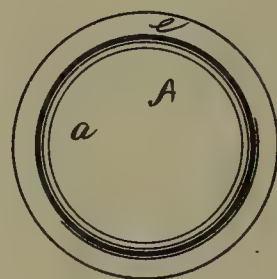


Fig. 9

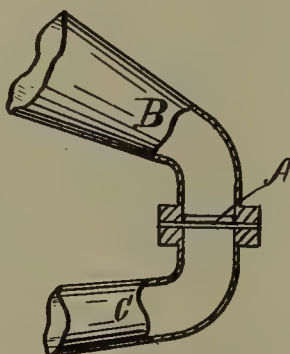


Fig. 10

Witnesses
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SOUND REPRODUCING AND MODIFYING DEVICE.

No. 876,035.

Specification of Letters Patent.

Patented Jan. 7, 1908.

Application filed January 10, 1906. Serial No. 295,329.

To all whom it may concern:

Be it known that I, WILLIAM W. YOUNG, a citizen of the United States of America, residing in Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Sound Reproducing and Modifying Devices or Diaphragms for Phonographs and other Talking-Machines, of which the following is a specification, reference being had to the accompanying drawings and letters of reference marked thereon.

Heretofore, the sound produced by phonographs, graphophones, talking machines, etc., has been indistinct, metallic and resonant so that the words or other matter heard are not clear and distinct, the sound waves appearing to be confused and a rumbling, rasping sound produced instead of the clear, distinct tones and sounds desired.

The object of my invention is to produce a simple and inexpensive device which may be readily adjusted in place and which will overcome the objections heretofore obtaining, and which will result in the giving forth of clear and distinct sound waves free from confusion and free from the metallic, resonant and scratching effect frequently found in machines of the class referred to.

I accomplish the objects of my invention by the construction herein disclosed.

In the accompanying drawings, in which like letters of reference indicate like parts, Figure 1 is a transverse sectional view of one form of my invention in which the simplest form of air chamber is shown; Fig. 2 is a similar view of my device showing a diaphragm arranged in the air chamber next to one of the walls thereof; Fig. 3 is a similar view showing a diaphragm centrally arranged, thus forming two air chambers; Fig. 4 is a like view showing one inner diaphragm centrally arranged in the air chamber and one diaphragm located adjacent one outer wall; Fig. 5 is a like view showing a different shape of the outer casing; Fig. 6 is a like view showing two interior diaphragms, thus forming three air chambers; Fig. 7 is a like view showing the outer edge tapering to fit into a taper opening; Fig. 8 is a perspective view on a smaller scale of a shell adapted to receive a device shaped like that shown in Fig. 7; Fig. 9 is a plan view of my device constructed as shown in Figs. 1 to 6, inclusive, and Fig. 10 is a view on a greatly reduced scale of a section of a sound conduit and a section of a horn

with a diaphragm between. Figs. 1 to 7, inclusive, are on a scale greatly enlarged beyond the size of the device as ordinarily made for the instruments in common use.

In detail, A indicates the device as a whole; B, the horn extension or smaller end of the horn; C, the sound conduit extending to the horn or horn extension; D, a shell adapted to hold the device A when the same is inserted in a tapering receptacle; *a* indicates one outer wall of the device and *b* the other outer wall; *c* indicates rings mounted between the two walls; *d* and *d'* indicate inner diaphragms of celluloid or other suitable material; *e* indicates an annular projection by which the device is held in position, and *f* indicates a tapering periphery.

I find that a construction comprising two pieces of material so arranged with reference to each other as to form an air chamber therebetween, results in greatly modifying and clarifying the sounds or tones that issue from a machine of the character referred to. In such construction the outer wall or walls form a diaphragm and the air space therebetween forms an air cushion. I find further that the introduction into such space or chamber of a diaphragm formed of a sheet of celluloid or other like material will greatly improve the tone, and when so constructed the device is provided with an air chamber or cushion either on one or upon both sides of such introduced diaphragm.

I find that for the outer material the best result is attained by the employment of soft leather stretched to a reasonable extent and cemented or otherwise held in position. When a celluloid film is employed as an interior diaphragm the best result is attained by the employment of a sheet of celluloid chemically treated, such treatment comprising coating such film or sheet upon one or both sides with an emulsion of gelatin and then subjecting the sheet so coated to the action of acetic acid, followed by treatment with a solution of hyposulphid of soda. This treatment preserves the celluloid sheet, preventing subsequent chemical action; also preventing expansion or contraction, thus preserving it in its original, normal condition when inserted in the device, and insures its constant normal action.

The device may of course be employed as an original diaphragm, or as a part of the same, or as a supplementary device, as herein set out in detail, the principles of

the air chamber being employed in each instance.

It will, of course, readily be seen that in some instances a sheet of isinglass, birch-
5 bark, thin metal, glass, or other suitable material may be employed for the interior or inserted diaphragm or diaphragms. There must be employed, however, to give the desired result, one or more air cushions or air
10 diaphragms, so that the action of the sound waves is transmitted to such interior diaphragm by the confined air. As at present advised, in most instances the celluloid sheet treated as above described gives the
15 best result, but in some instruments, and with some records, I find that where the interior diaphragms are constructed of the other materials above referred to, a very desirable and improved result is attained.

20 In order to give the best results, my device should be inserted in the sound conduit at a point between the reproducing diaphragm forming part of the machine and the smaller end portion of the horn, as for
25 instance, in the machine known as the "Victor" I find it advisable to introduce the device in the conduit at the point where the horn extension B joins the conduit C. I find also, for convenience in introducing and
30 removing the device, it is desirable in some instances, especially for use in machines having no joint, similar to that referred to—the Victor, to construct the device of the shape shown in Figs. 7 and 8, the periphery
35 of the device being slightly tapering to conform to the taper of the horn, and by preference the periphery should be covered with a soft material like leather or other similar material. I find also that in some instances
40 a very desirable result may be attained by arranging two interior diaphragms in such manner that there is an air space or cushion therebetween, and that the outer portions or walls of the device consist of soft leather
45 having one or more openings.

The best result is attained when the outer walls are made of soft leather held snugly in position and one or more inner diaphragms are arranged between the outer walls, the
50 inner diaphragm or diaphragms being made of materials other than leather.

The shell shown in Fig. 8 is adapted to receive one of the devices shaped like that shown in Fig. 7, and I prefer that the smaller
55 end of the same be covered with soft leather so as to form an air space between the inserted device A and the leather covering on the smaller opening in the ring or shell D, so that, with different records and different in-

struments, the parts may be used together 60 or detached, thus varying the tones. It will be seen that several of the devices may be so arranged as to be built up, one upon the other, and these being inserted in the horn or other part of the sound conduit will en- 65 able the user to adapt the devices to instruments and records of different kinds, and if it be found that one of the devices does not give the desired result with a particular instrument or record, then another 70 may be readily added, and in this way the user may change the number of devices until the desired result as to sound and clearness is attained.

While in machines like the "Victor" I 75 prefer to introduce the device at the joint as shown in Fig. 10, I may introduce the same at any other convenient point in the sound conduit.

I prefer to employ separating rings made 80 of cardboard, but of course various changes in construction may be made and the same desirable results be obtained.

Having therefore described my invention, what I claim and desire to secure by Letters 85 Patent, is—

1. A device of the character described, comprising outer walls extended or flanged exteriorly and fastened together at these points, and one or more imperforate inner 90 diaphragms.

2. In combination with a talking machine, an independent device of the character described, adapted to be placed in the sound conduit of the machine, comprising outer 95 walls extended or flanged exteriorly and fastened together at these points, and having one or more air chambers between them.

3. A device of the character described, having outer walls of leather extended or 100 flanged exteriorly and fastened together at these points, and one or more inner diaphragms of vibrative material.

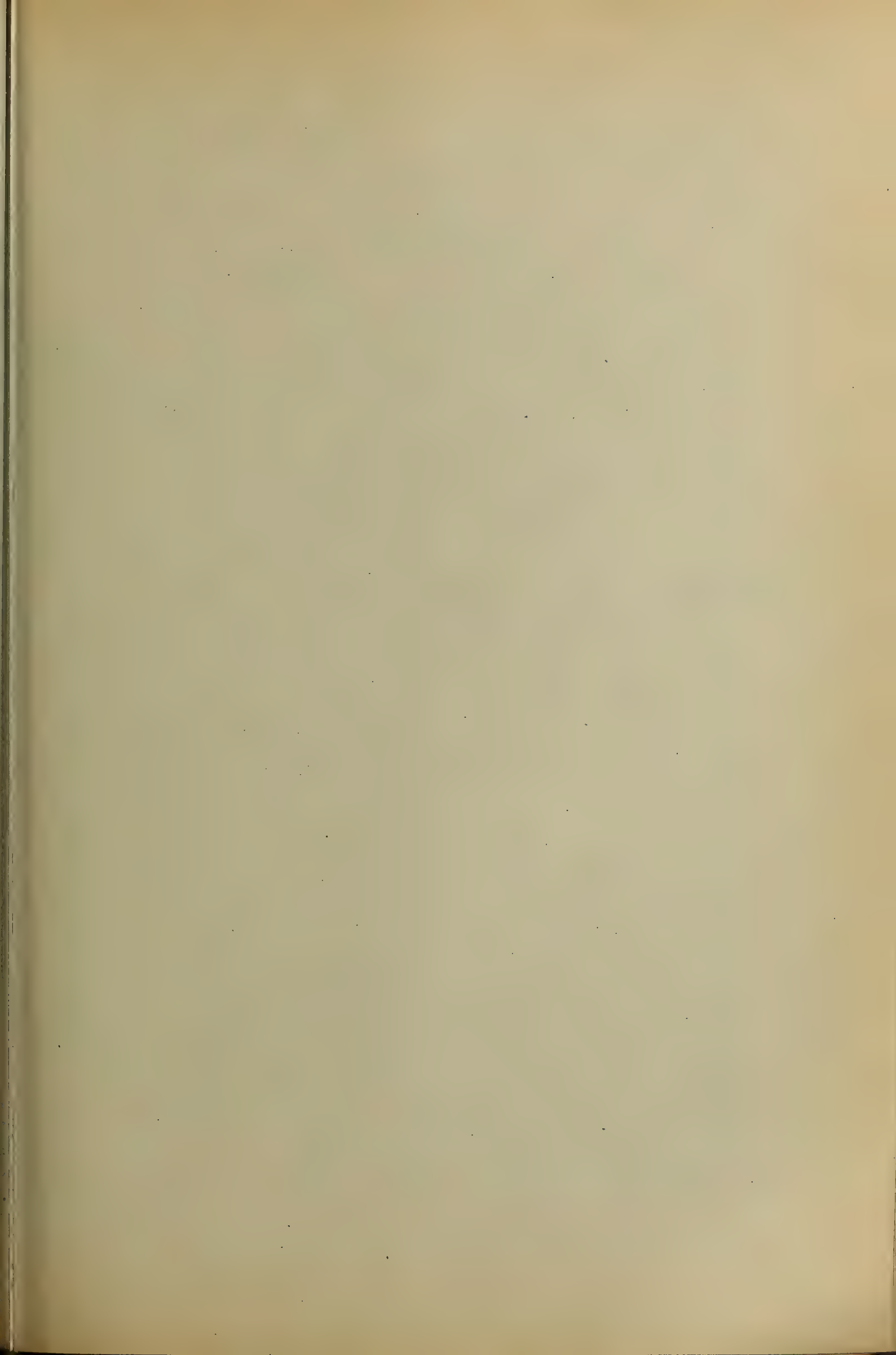
4. The combination of a closed shell adapted to fit into a sound conduit of a talking machine, such shell consisting of pieces of 105 leather attached to each other at their outer edges, and one or more sound modifying devices shaped to fit into said shell whereby one or a plurality of said devices may be em- 110 ployed at will.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM W. YOUNG.

Witnesses:

ALLEN WEBSTER,
J. M. STERNS.



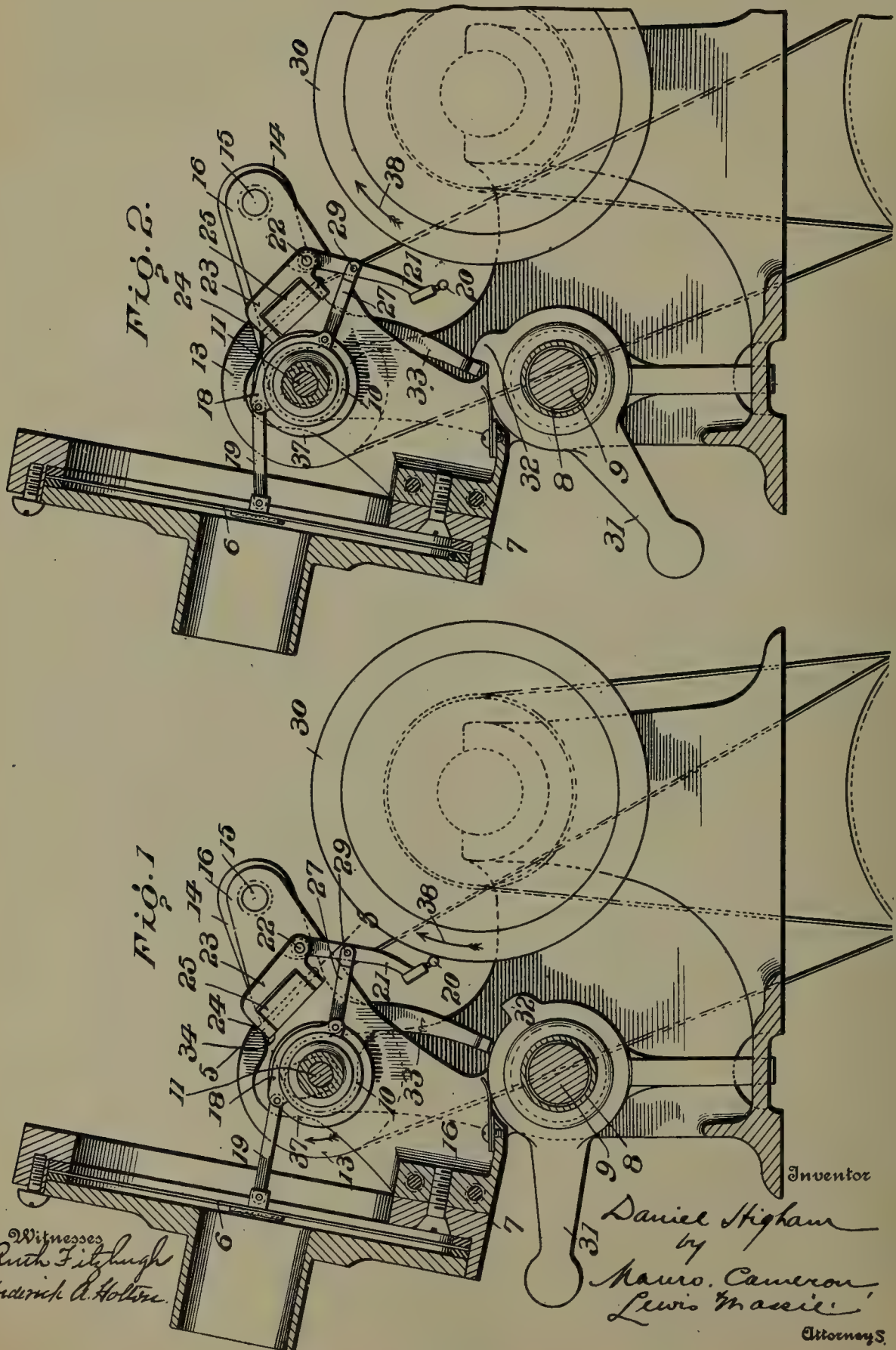
No. 876,350.

PATENTED JAN. 14, 1908.

D. HIGHAM.
GRAPHOPHONE.

APPLICATION FILED APR. 16, 1906.

2 SHEETS—SHEET 1.



No. 876,350.

PATENTED JAN. 14, 1908.

D. HIGHAM.
GRAPHOPHONE.

APPLICATION FILED APR. 16, 1906.

2 SHEETS—SHEET 2.

Fig. 5.

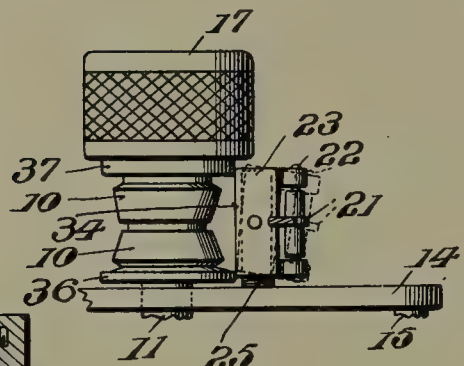


Fig. 4.

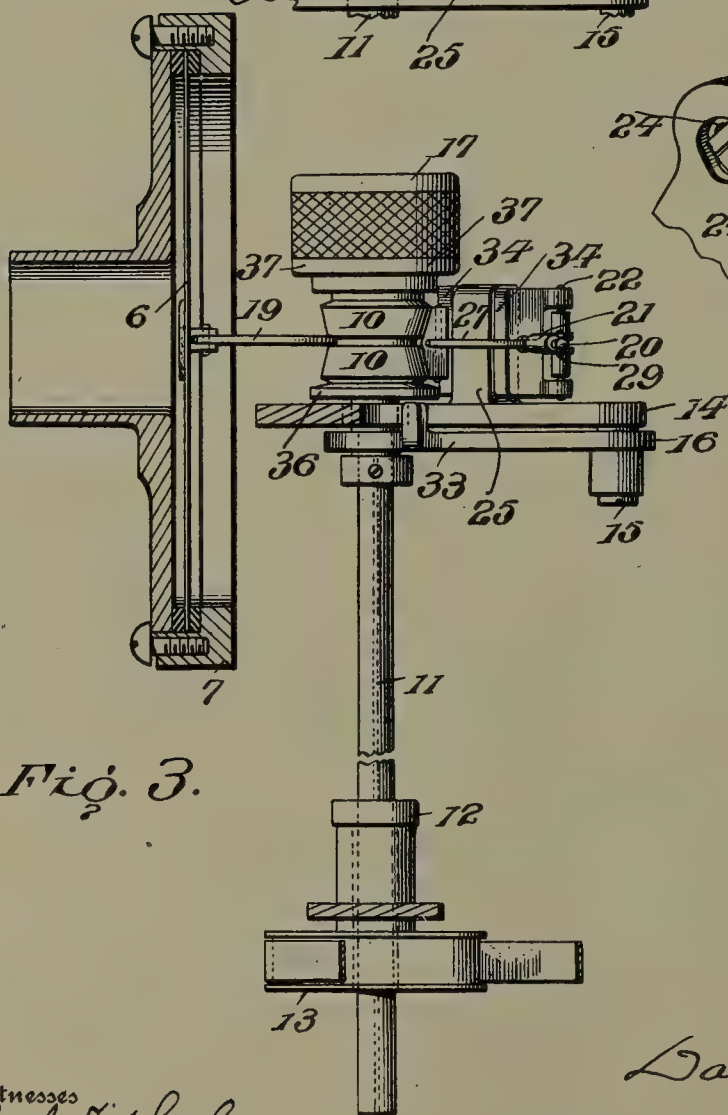
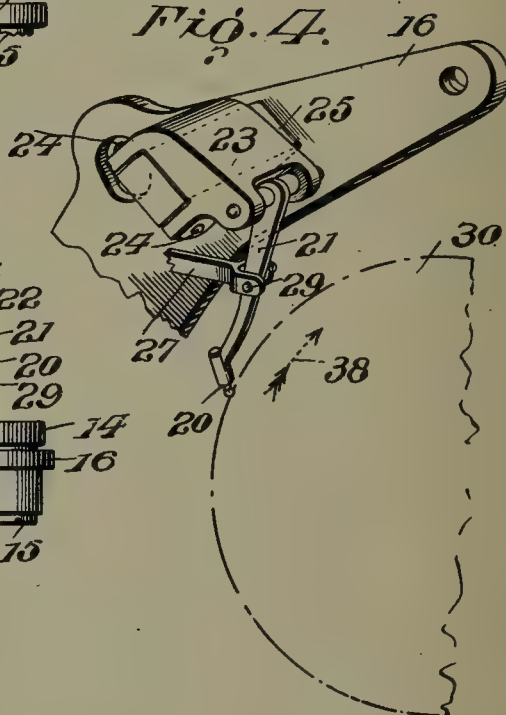


Fig. 3.

Inventor

Daniel Higham

Witnesses
Ruth Fitzhugh
Frederick A. Holton

By
Mauro Cameron Lewis Massie

Attorneys

UNITED STATES PATENT OFFICE.

DANIEL HIGHAM, OF BRIDGEPORT, CONNECTICUT.

GRAPHOPHONE.

No. 876,350.

Specification of Letters Patent.

Patented Jan 14, 1908.

Application filed April 16, 1906. Serial No. 312,020

To all whom it may concern:

Be it known that I, DANIEL HIGHAM, of Bridgeport, Connecticut, have invented a new and useful Improvement in Graphophones, which invention is fully set forth in the following specification.

This invention relates to phonic apparatus wherein frictional means are used to amplify the force of the sonorous vibrations. Apparatus of this character are described in my Patents No. 678,566 of July 16, 1901, and No. 783,750 of February 28, 1905.

The object of the present invention is to simplify and improve the construction and operation of the apparatus of the general character specified above.

The main improvement effected by the present invention consists in dispensing with the floating weight heretofore employed to keep the stylus in contact with the sound-record with yielding pressure, and in so constructing and arranging the stylus-lever that the swinging shaft serves both to press the friction wheel against the friction shoe by gravity and also to press the stylus against the sound-record by gravity.

The accompanying drawings illustrate the preferred manner of carrying out the present invention:

Figure 1 is a vertical section through the center of the diaphragm; Fig. 2 is a similar view showing the stylus raised out of contact with the sound-record; Fig. 3 is a bottom plan view of the friction devices; Figs. 4 and 5 are detail views of said friction devices, Fig. 4 being a perspective view, and Fig. 5 a view looking downwards in the direction of the line 5—5 Fig. 1.

The construction illustrated in the drawings is in its general feature that now in use.

Diaphragm 6 is mounted on carriage 7 mounted to slide as usual on tube 8, within which is the feed-screw 9. Friction-wheel 10 is carried by the sliding telescopic shaft 11, of usual construction, which rotates in the direction of arrow Fig. 1. This shaft is supported at one end in bearing 12 in the frame, and at the other in a swinging arm 14, pivoted at 15 to an arm 16 which is fixed to carriage 7. At the end of shaft 11 is a weight 17. The friction shoe 18 is attached by a link 19 to the diaphragm 6, and is in contact with friction-wheel 10, the normal pressure of the friction devices being thus automatically regulated and adjusted in the manner

described in my Patent No. 783,750, aforesaid. As thus far described, the mechanism does not differ materially from the construction now in common use.

The reproducing point or stylus 20 is carried by a lever 21, which lever is pivoted at 22 to a block 23, which is pivoted on pin 24 to a projection 25 of the arm 16. Stylus-lever 21 is connected by a link 27 with friction-shoe 18. It will thus be seen that the stylus is not carried by a floating weight but by an arm rigidly attached to the carriage. The stylus-support as a whole, consisting of the parts 21 and 23, has two joints, 22 and 24, the axes of which are relatively so disposed that the stylus can be moved (turning on pivot 22) towards and from the sound-record 30, and can have also a lateral movement (on pivot 24) to compensate for irregularities in the sound-groove.

The machine is provided with the usual lifting lever 31, which serves to engage and disengage the carriage with the feed-screw in the well-known manner. This lever is provided with the usual projection or lug 32, for disengaging the stylus from the sound-record. Swinging arm 14 which carries the movable bearing of shaft 11 has a finger 33 extending downwards into the path of lug 32. Fig. 1 shows the parts in their operative position. When lifting lever 31 is depressed, as shown in Fig. 2, contact of lug 32 with finger 33 raises arm 14 and shaft 11. This movement turns lever 21 on its pivot 22 and disengages the stylus from the sound-record. When the parts are in their operative position, the stylus is held against the record by the yielding pressure of swinging shaft 11 and its weight 17.

It is important that the swiveled block 23, to which the lever 21 is pivoted, should have an elongated bearing, and should have appreciable inertia. If the lever were simply pivoted on a narrow bearing to swing laterally, it would not accurately track the record. The inertia of the block is sufficient to prevent the lever 21 from being readily thrown aside. In order that the lever 21 may pull itself to a central position when the stylus is lowered onto the smooth part of the record, the line 5—5 of the axis of the tilting block 23 is such that it passes close to the point 29 at which link 27 is attached to lever 21.

The construction illustrated and described tracks the record very accurately, even when the sound-record rotates against the point of the stylus (as indicated by arrow 38) contrary to the usual practice.

When the swinging shaft 11 is lifted by means of lever 31, the face 34 of tilting block 23 comes in contact with circular flanges 36, 37 on shaft 11 (see Fig. 5) whereby the block and stylus-lever are brought to central position before the stylus is again lowered. The dotted lines of Fig. 5 indicate a tilted position which these parts may have assumed.

What is claimed is:

1. In a phonic apparatus, the combination of the diaphragm, a carriage therefor, sound-amplifying friction means on said carriage, a swinging shaft by which one of the friction members is carried, a stylus connected with said diaphragm through said friction means, and pressed against the sound-record by the weight of said shaft, said stylus being pivoted to a tilting block.

2. In a phonic apparatus, the combination of the diaphragm, a carriage therefor, sound-amplifying friction means on said carriage, a swinging shaft by which one of the friction members is carried, a stylus connected with said diaphragm through said friction means, and pressed against the sound-record by the weight of said shaft, said stylus being pivoted to a tilting block having appreciable inertia.

3. In a phonic apparatus, the combination of the diaphragm, a carriage therefor, sound-amplifying friction means on said carriage, a swinging shaft by which one of the friction members is carried, a stylus connected with said diaphragm through said friction means, and pressed against the sound-record by the weight of said shaft, and means for lifting said shaft and thereby

disengaging said stylus from the sound-record.

4. In a phonic apparatus, the combination of the diaphragm, a carriage therefor, sound-amplifying friction means on said carriage, a swinging shaft by which one of the friction members is carried, a stylus connected with said diaphragm through said friction means, and pressed against the sound-record by the weight of said shaft, means for lifting said shaft, thereby disengaging the stylus from the sound-record, and means for bringing the stylus, when raised, to a central position.

5. In a phonic apparatus, the combination with a diaphragm, of two co-acting elements constituting a friction device, a sound record, a rocking member, a stylus lever pivoted to said rocking member to swing in a plane substantially parallel with the axis of the rocking member, a stylus supported by said lever to contact with said record, connections between one of the friction elements and said stylus lever, and connections between the said friction element and said diaphragm.

6. In a phonic apparatus, the combination with a diaphragm, of a sound record, a stylus-lever bearing a stylus coacting with said record, a friction device one member of which normally presses the stylus-lever towards the record, means connecting the other member of the friction device to said stylus-lever and said diaphragm, and a rocking member to which said stylus-lever is fulcrumed.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

DANIEL HIGHAM.

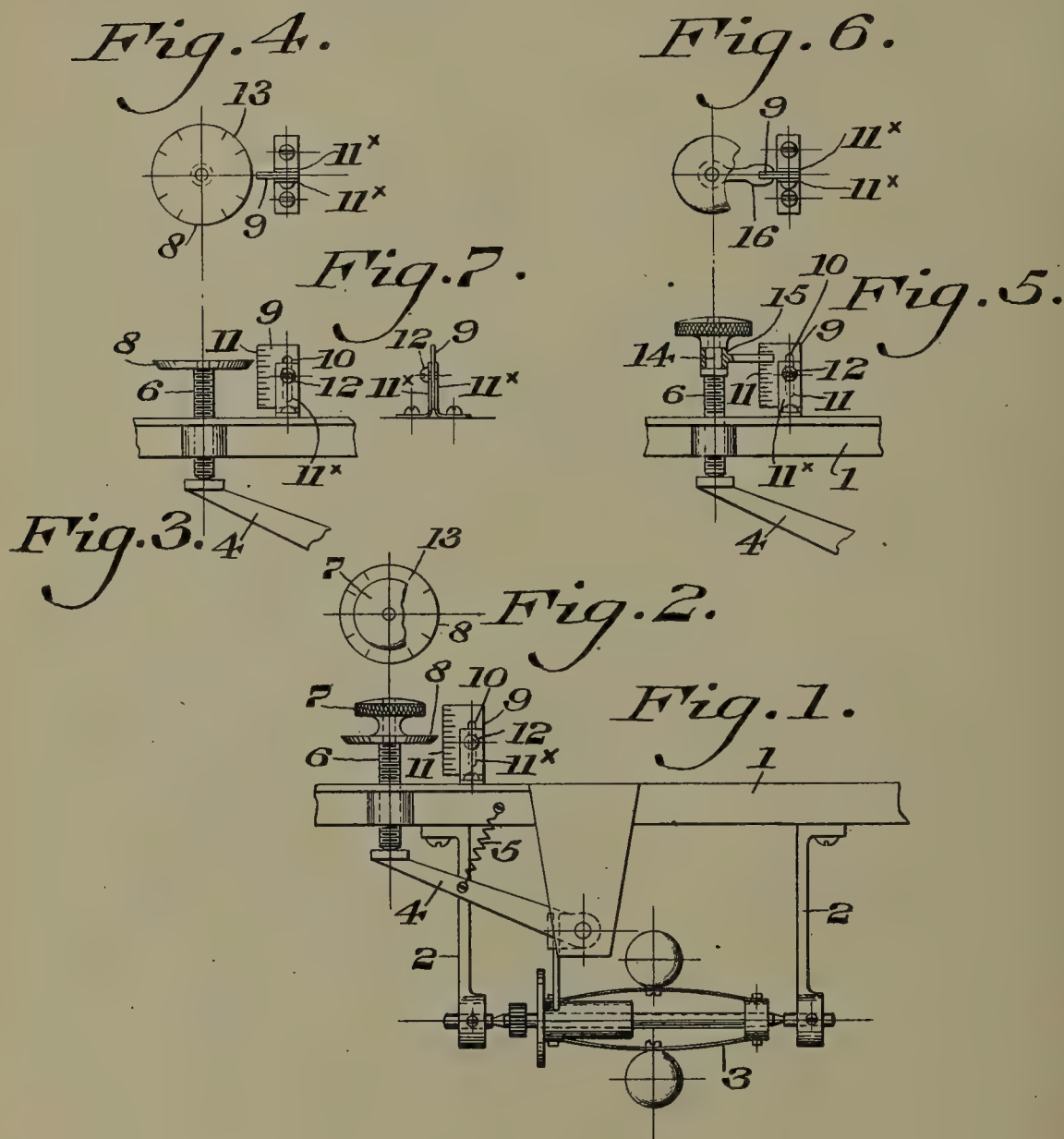
Witnesses:

A. B. KEOUGH,
C. A. GIBNER.

No. 876,673.

PATENTED JAN. 14, 1908.

W. W. WOOSTER.
SPEED REGULATOR AND INDICATOR.
APPLICATION FILED APR. 9, 1907.



Witnesses:
P. F. Nagle
L. Douville.

Inventor
Warren W. Wooster.
By Biedersheim & Fairbanks.
Attorneys.

UNITED STATES PATENT OFFICE.

WARREN W. WOOSTER, OF BERLIN, NEW JERSEY.

SPEED REGULATOR AND INDICATOR.

No. 876,673.

Specification of Letters Patent.

Patented Jan. 14, 1908.

Application filed April 9, 1907. Serial No. 367,286.

To all whom it may concern:

Be it known that I, WARREN W. WOOSTER, a citizen of the United States, residing at Berlin, in the county of Camden, State of New Jersey, have invented a new and useful Speed Regulator and Indicator, of which the following is a specification.

My invention relates to a new and useful time indicator for phonographs and the like and consists of means in suitable relation with the adjusting device of the revoluble part or parts of the phonograph or other device for the purpose of predetermining the velocity or rate of speed at which said part or parts shall revolve.

It further consists of other novel details of construction, all as will be hereinafter fully set forth.

Figure 1 represents a side elevation of a portion of a phonograph or like device, showing my time indicator in position. Fig. 2 represents a plan view of the adjusting screw, a portion of the head being broken away. Fig. 3 represents a side elevation of a portion of the device shown in Fig. 1, with a different form of screw employed. Fig. 4 represents a plan view of some of the parts shown in Fig. 3. Fig. 5 represents a partial side elevation and partial sectional view, showing a form of screw that may be employed. Fig. 6 represents a plan view thereof, showing a portion of the head of the said screw broken away. Fig. 7 represents a front elevation, showing the manner of mounting the scale.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings. In the drawings, I have shown a device for indicating the speed at which the revoluble parts of a phonograph or a like device are to rotate in order to give the desired speed to the reproducing parts.

It will be evident that certain changes may be made in the construction shown which will come within the scope of my invention and I do not, therefore, desire to be limited in every instance to the exact construction shown.

1 designates a bed plate of the machine, to which is suitably attached, the hangers or bearings 2 carrying the governor 3.

In suitable connection with the governor 3 is a lever 4, which is pivotally mounted at a suitable stationary point and has connected therewith, a spring 5 tending to move the

same upwards, it being understood that the proper movement of the lever 4 acts upon the governor 3 to cause the same to rotate in a slower and faster manner as desired.

In threaded engagement with a suitable portion of the device is a set screw 6, which bears upon the end of the lever 4 for adjusting the position of the same, said set screw having a disk or head 8, and a thumb piece 7 thereon, it being understood that as the set screw 6 is rotated it will move upwards or downwards in its support and will cause the free end of the lever to be moved in a corresponding direction and thus control the governor.

9 designates a plate or scale which is provided with a slot 10 and has the graduations 11 thereon suitably numbered or provided with indicators in order that readings may be made therefrom.

11^x designates ears suitably connected in the present instance with the bed plate 1 adjacent the set screw 6, it being noted that the scale or plate 9 is adapted to be carried on said ears and that a set screw 12 passing through said ears and the slot 10 in the plate is adapted to lock the same in proper position, it being understood that by reason of this construction, the scale or plate can be raised or lowered to a desired adjusted position. By reason of the position of the scale, the disk 8 will register in its movement with the various graduations of the scale, so that the position of said set screw and of the lever 4 can be positively determined and thus the speed of the phonographs regulated.

Upon the upper face of the disk 8, I may provide graduations or a scale 13, so that the position of the set screw can be made in an accurate manner and to any degree of fineness.

It will be understood that the scale or plate 9 can be adjusted depending upon the phonograph or the like to which it is applied, after which the readings can be made as above described.

In Figs. 3 and 4, I have shown the set screw 6 without the head 7, the disk 8 thereon serving as a means for engaging with the hand of the operator to rotate the screw.

In Figs. 5 and 6, I have shown the disk 8 as omitted and I have provided the set screw 6 with a neck 14 adapted to receive a collar 15 from which projects the yoke 16, the arms of said yoke being adapted to seat or receive the scale or plate 9, so that the

arms of the yoke will register with the graduations of the scale in order that readings may be accurately taken.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a device of the character described, a lever, a set screw co-acting with said lever to adjust the same, a disk on said set screw, graduations on said disk and a scale adjacent said screw having graduations thereon from which readings may be taken depending upon the position of the disk.

2. In a device of the character described, a lever, a set screw directly engaging and co-acting with said lever, a graduated member carried by said set screw, a scale independent of and coacting with said graduated member and having graduations thereon with which said member registers whereby the speed of the device can be determined and means for adjusting said scale parallel with said set screw.

3. In a device of the character described, a lever, a set screw having its end resting directly upon and co-acting with said lever, a disk on said set screw, a head on said set screw above said disk and of smaller diame-

ter, and a scale adjustably mounted adjacent said disk from which readings can be taken directly by said disk.

4. In a device of the character described, a lever, a set screw co-acting with said lever, a plate having graduations thereon, ears suitably supported, and means for adjustably connecting said scale with said ears whereby said scale can be adjusted with respect to the mechanism.

5. In a device of the character described, a lever, a set screw coacting with said lever, a yoke carried by said set screw and a scale adjustably mounted adjacent said set screw and seated in said yoke.

6. In a device of the character described, a lever, a bodily movable set screw independent of and bearing on said lever to adjust the position thereof, a thumb piece or head on said set screw, an indicating member carried by said set screw and a scale mounted in proximity to and parallel with said set screw and at right angles to said indicating member.

WARREN W. WOOSTER.

Witnesses:

JOHN A. WIEDERSHEIM,
C. D. McVAY.

No. 876,865.

PATENTED JAN. 14, 1908.

R. A. DENO VAN.
PHONOGRAPHIC RECORD CABINET.

APPLICATION FILED APR. 3, 1907.

Fig. 1.

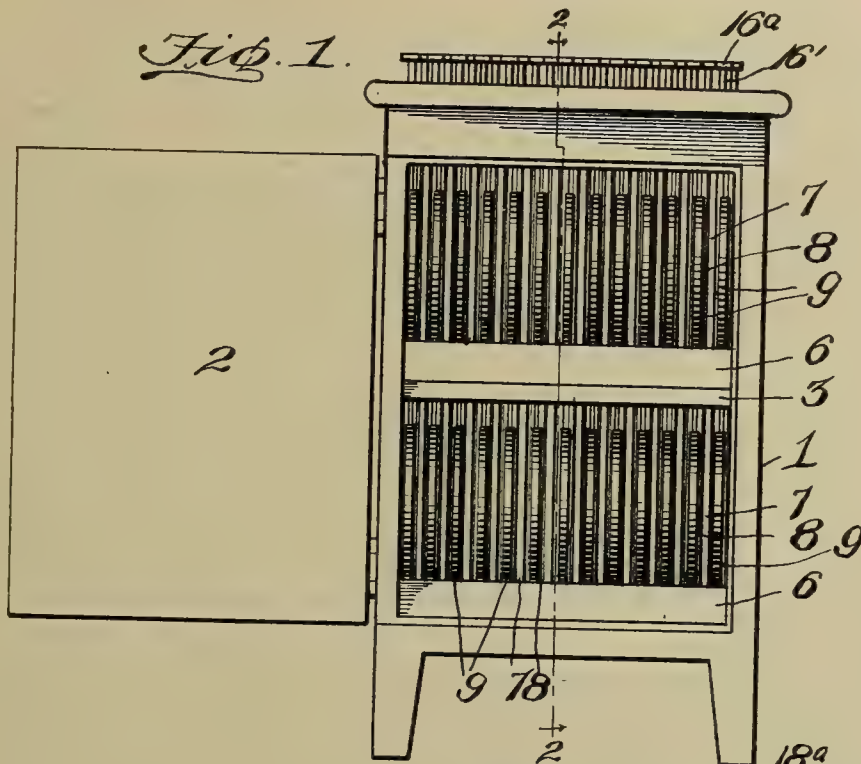


Fig. 2.

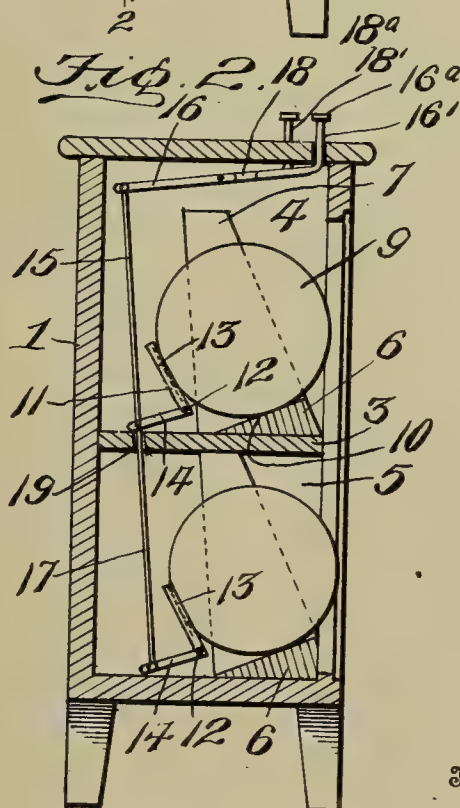
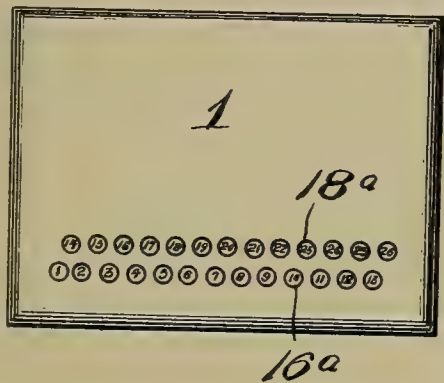


Fig. 3.



Inventor

Robert A. Denovan,

Witnesses

J. T. L. Wright.

C. C. Hines.

By

Victor J. Evans

Attorney

UNITED STATES PATENT OFFICE.

ROBERT A. DENOVA, OF DALKEITH, ONTARIO, CANADA.

PHONOGRAPHIC-RECORD CABINET.

No. 876,865.

Specification of Letters Patent.

Patented Jan. 14, 1908.

Application filed April 3, 1907. Serial No. 366,218.

To all whom it may concern:

Be it known that I, ROBERT A. DENOVA, a subject of the King of Great Britain, residing at Dalkeith, in the Province of Ontario and Dominion of Canada, have invented new and useful Improvements in Phonographic-Record Cabinets, of which the following is a specification.

This invention relates to improvements in cabinets especially designed for the storage of phonographic records of the gramophone disk type, the main object of the invention being to provide a simple and convenient construction of cabinet having individual spaces or compartments for a plurality of disks and means by which any desired one of the stored disks may be readily projected for removal.

In the accompanying drawings,—Figure 1 is a front elevation of the cabinet with the door thereof thrown open to expose the disks. Fig. 2 is a section on the line 2—2 of Fig. 1. Fig. 3 is a top plan view of the cabinet.

Referring to the drawings, wherein like reference characters denote corresponding parts throughout the several views, the numeral 1 designates the body of the cabinet, which is preferably of rectangular form and open at the front to provide a doorway giving access thereto, said doorway being of proper size and form for the insertion and removal of the records and adapted to be closed by a hinged door 2.

The interior of the cabinet is divided by horizontal partition 3 to provide a plurality of compartments 4 and 5, arranged, as shown, one above the other. At the lower front portion of each compartment a cross strip or bar 6 is arranged and is provided with a plurality of upwardly extending partitions or standards 7, the standards being spaced to form a series of storage spaces 8 for the record disks 9. The upper surface of the strip is beveled or inclined downwardly and rearwardly at the base of each chamber 8 to form a shelf 10 against which the lower edge of the disk rests, thus tending to cause the disks to move rearward by gravity, thereby preventing them from becoming dislodged and dropping out at the front of the cabinet when the door is opened.

In order to hold each disk from rearward movement and to project it when desired, an ejecting device comprising a bell crank lever 11 is provided. The levers in each

compartment are pivotally mounted at their angles upon transverse supporting rods 12, and the upright arm 13 of each lever is arranged to bear against the rear edge of the disk 9 and is preferably grooved to receive the same, said arm extending at an upward and rearward inclination, while the other arm 14 of the lever normally projects downwardly and rearwardly as shown. The levers hold the several disks from rearward movement in an obvious manner and are designed to be operated to project the disks over the inclined shelves 10 partially through the doorway, so that they may be conveniently removed.

The levers within the compartments 4 are arranged on lines between the levers in the compartment 5, or alternate in arrangement therewith on vertical lines, and the levers in compartment 4 are pivotally connected by rods 15 with a set of operating levers 16 disposed in the upper portion of said compartment, while the levers in the compartment 5 are pivotally connected by rods 17 with a corresponding set of levers 18 located in the compartment 4 in alternate arrangement with the levers 16, said rods 17 being vertically movable through openings 19 in the partition 3. The forward end of the levers 16 extend in advance of the levers 18, and said levers are provided with upwardly bent arms 16' and 18' projecting upward through openings in the top of the cabinet and carrying push buttons 16^a and 18^a respectively designed to be pressed to rock the levers for the purpose of transmitting motion to the rods to swing the bell crank levers for the projection of the record disks.

For convenience in the use of the cabinet, storage and removal of the records, the record holding spaces in the compartments 4 and 5 are consecutively numbered and the disks designed to be stored therein correspondingly numbered. The rows of push buttons respectively carried by the levers 16 and 18 are also numbered in like manner, and the user of the cabinet by depressing one of the buttons may project the numbered disk designated thereby partially through the doorway, so that it may be conveniently grasped and removed. The disks may, of course, be catalogued by title and number in order that any particular disk desired may be projected by manipulating the button designated by

the catalogue, thus obviating the necessity of examining each record before the particular one desired can be found.

The manifold advantages of the cabinet will be readily appreciated, and it will be seen that the invention provides a simple and effective construction of means for supporting and projecting the record disks at will.

Having thus described the invention, what is claimed as new, is:—

1. A phonographic record cabinet provided with upper and lower compartments, each provided with a plurality of record receptacles, said cabinet being provided with a doorway at the front thereof for said compartments, and retaining means at the lower front portions of the respective receptacles of the compartments to support and hold the records from forward movement, ejecting devices in the compartments to engage the records and hold them in engagement with said retaining devices, and operating means for said ejecting devices.

2. A phonographic record cabinet provided with upper and lower compartments, each having a plurality of record cells or receptacles therein, retaining means for holding the record disks from forward movement in said cells, ejecting devices holding the disks from rearward movement and adapted when operated to force the same forward, operating rods extending upwardly from said devices to the top of the upper compartment, and sets of levers connected respectively with the rods of the ejecting devices in the upper and lower compartments, said levers having operating devices at the top of the cabinet arranged in distinguishing rows.

3. A phonographic record cabinet provided with a record receptacle, retaining means for normally holding the record disk from forward movement therein, an ejecting device at the rear of the receptacle adapted for holding the disk from rearward move-

ment, and means for operating said ejecting device to project the disk forward.

4. A phonographic record cabinet provided with a doorway, a plurality of record receptacles therein having downwardly and rearwardly inclined shelves to support the records therein, projecting devices engaging the records to hold them in contact with the shelves, and means for individually operating said projecting devices.

5. A phonographic record cabinet provided with a record receptacle, a downwardly and rearwardly inclined support at the base of the receptacle, a bell crank lever at the rear of the receptacle, one arm of which is arranged to engage the rear edge of a disk occupying the receptacle to hold the same from downward movement on the inclined support, and means connected with the other arm of said lever for rocking the same to project the disk forwardly.

6. A phonographic record cabinet provided with record receptacles having inclined shelves to hold the records from outward movement, projecting devices in rear of the receptacles to normally hold the records from rearward movement, and means for operating the projecting devices.

7. A phonographic record cabinet provided with a doorway, a downwardly and rearwardly inclined shelf at the base of the doorway, bell crank levers in rear of the shelf adapted to engage and hold the records in contact therewith, standards extending from the shelf and forming individual holders for the records, and means for individually operating the bell crank levers to project the records.

In testimony whereof, I affix my signature in presence of two witnesses.

ROBERT A. DENOVA.

Witnesses:

ELMA MOONEY,
P. S. PAQUETT.

No. 877,184.

PATENTED JAN. 21, 1908.

J. C. ENGLISH.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED JULY 6, 1903.

Fig. 1.

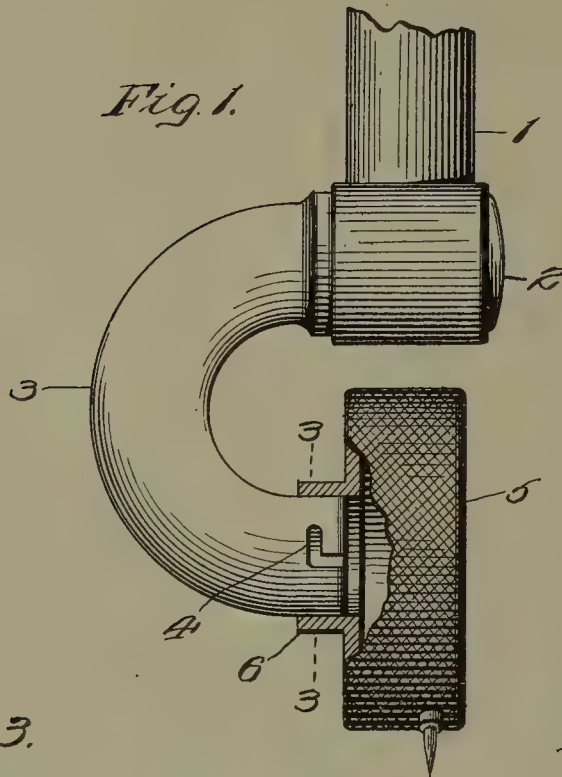


Fig. 3.

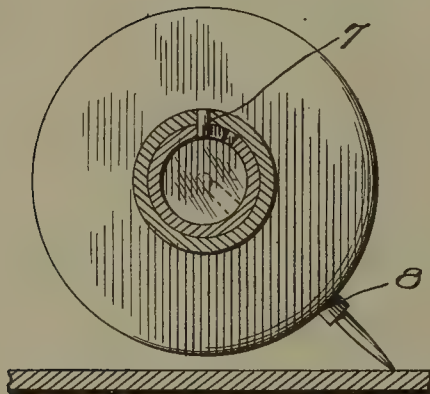


Fig. 2.

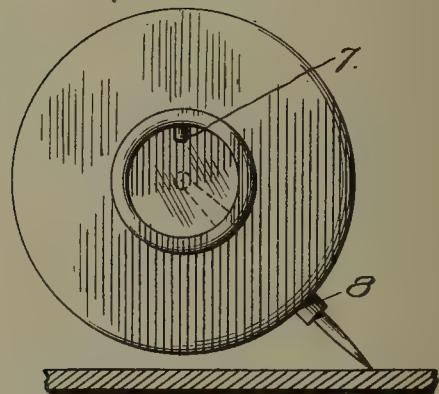
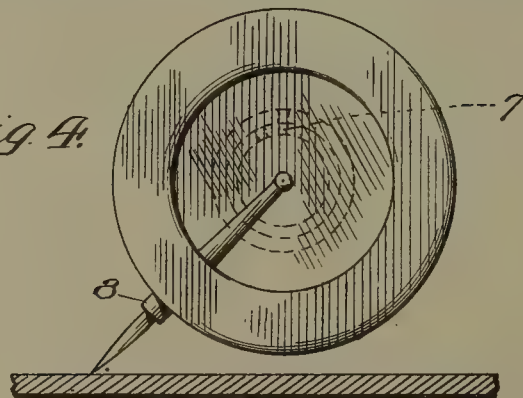


Fig. 4.



WITNESSES:

F. J. Hartman.

Chas. B. Smith

INVENTOR

John C. English

BY

Horace Pettit.

ATTORNEY.

UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX FOR TALKING-MACHINES.

No. 877,184.

Specification of Letters Patent.

Patented Jan. 21, 1908.

Application filed July 6, 1903. Serial No. 164,276.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a full, complete disclosure.

The object of my invention is to provide cooperating interlocking means for fastening sound boxes, which are used in connection with talking machines, to the sound tube or swinging arm thereof, in such a manner that the same may be quickly and securely locked together in position, and as readily unlocked, said means, in addition to performing the above functions, also forming a guide or stop for positioning the stylus bar with respect to the record so that the stylus, which is carried thereby, may form the correct working angle with the record.

Broadly, my invention consists in providing a joint connecting the sound box and the sound conveying tube with parts which easily interlock to prevent longitudinal separation of said members and at the same time form a stop for limiting the rotary movement of the sound box upon said tube and to determine the angle of the stylus bar in relation to the record.

For a full, clear and exact description of my invention reference may be had to the following specification and to the accompanying drawing forming a part thereof, in which

Figure 1 is a plan view of the end of the sound conducting tube with the sound box in position thereon and showing a part of the sound box broken away; Fig. 2, a side elevation of the sound box removed from the tube and showing the part thereof which engages said tube; Fig. 3, a sectional view taken substantially on the line 3—3 of Fig. 1; and Fig. 4, an elevation of the sound box showing the outside thereof, or that opposite to the sound tube.

Referring to the drawing, the numeral 1 indicates a portion of the sound tube which is jointed at 2 to a semicircular curved portion 3 the end of which terminates substantially in alinement with the portion 1. The outer end of the curved portion is provided with an L-shaped slot 4, a part of which is parallel with the end of said curved portion and the other part of which extends inwardly

from said end. The sound box proper 5 is made in the usual form but is provided with a short tube or collar 6 which has a pin or stud 7 projecting therefrom inwardly. Said collar is adapted to telescope externally with the curved portion 3 and the pin 7 is adapted to engage the L-shaped slot 4.

In placing the sound box in position upon the end of the curved portion of the tube the pin is made to pass into the slot longitudinally of the sound box or tube and then is turned transversely so as to enter the other portion of the slot and so that said pin will abut against the end of said slot. The slot 4 is so located upon the end of the tube that when the pin is in the position just described the stylus bar 8 will hold the stylus or needle in the correct position to produce the best results from the sound record.

It will thus be seen that my improved means for connecting the sound box with the sound tube not only provides a simple and efficient joint but also provides means for holding the sound box in exactly the correct position in relation to the sound record. This is particularly desirable in a talking machine because of the fact that the parts are liable to be assembled by persons who are not skilled in handling apparatus and who are therefore careless in making correct adjustments.

Various changes may be made in the form and arrangement of parts herein set forth, for instance, the transverse recess may be of any preferred shape and may be located in either member of the joint and either part of said joint may be made to telescope within the other and other changes may be made without departing from the spirit and scope of my invention.

Having thus described my invention what I claim to be new and desire to protect by Letters Patent of the United States is:—

1. In a talking machine, the combination with a sound box, a support for said sound box and a stylus, of means for attaching said sound box to its support and for adjusting the stylus in operative position, comprising a bayonet joint, the members thereof being brought into operative engagement by a movement of that part of the sound box carrying the stylus relative to the support in the direction in which pressure is brought upon the stylus when in operative position.

2. In a talking machine, the combination

with a sound box, a support for said sound box and a stylus, of means for attaching said sound box to its support and for adjusting and holding the stylus in operative position, comprising a tube upon said sound box, an interior pin or lug mounted on said tube, and a tube upon said support adapted to enter the tube on said sound box, the tube on said support being provided with a slot to receive said pin, said pin being brought into engagement with the end of said slot by a movement of that part of the sound box carrying the stylus, relative to the support, in the direction in which pressure is brought upon the stylus when in operative position.

3. The combination with a sound box, a stylus and a sound conveyer by which the sound box is supported, of cooperating interlocking means in the sound box and conveyer operated to secure said parts in interlocked relation by a movement of said sound box relatively to said sound conveyer in the direction in which pressure is exerted upon the sound box, when the latter is in operative position.

4. The combination, with a sound box, a stylus and a sound conveyer, by which the sound box is supported, of cooperating interlocking means in the sound box and conveyer operated to secure said parts in interlocked relation by a movement of said sound box relative to said sound conveyer in the direction in which pressure is exerted upon the sound box, when the latter is in operative position, the said interlocking means being also operative to effect the adjustment of the stylus in its operative position.

5. The combination, with a sound box, a

stylus and a sound conveyer, of cooperating interlocking means carried by said sound box and conveyer, the said interlocking means being operated to secure said parts in interlocked relation and to hold the stylus in operative position by a movement of said sound box relative to said conveyer, transversely to and then in the direction in which pressure is exerted upon the sound box, when the latter is in operative position.

6. The combination, with a sound box, a stylus and a sound conveyer, of means for securing said sound box to said sound conveyer, comprising telescoping members carrying interlocking parts operative to secure said members together, and the said stylus in operative position by a movement of said sound box, relative to said conveyer in the direction in which pressure is exerted upon the sound box when the latter is in operative position.

7. The combination with a sound box, a stylus and a sound conveyer, of means for securing said sound box to said conveyer, comprising telescoping members carrying interlocking parts operative to secure said members together, and to hold said stylus in operative position by a movement of the said sound box relative to said conveyer, transversely to and then in the direction in which pressure is exerted upon the sound box, when the latter is in operative position.

In witness whereof I have hereunto set my hand this second day of July, A. D., 1903.

JOHN C. ENGLISH.

Witnesses:

CHAS. K. BENNETT,
LEWIS H. VAN DUSEN.

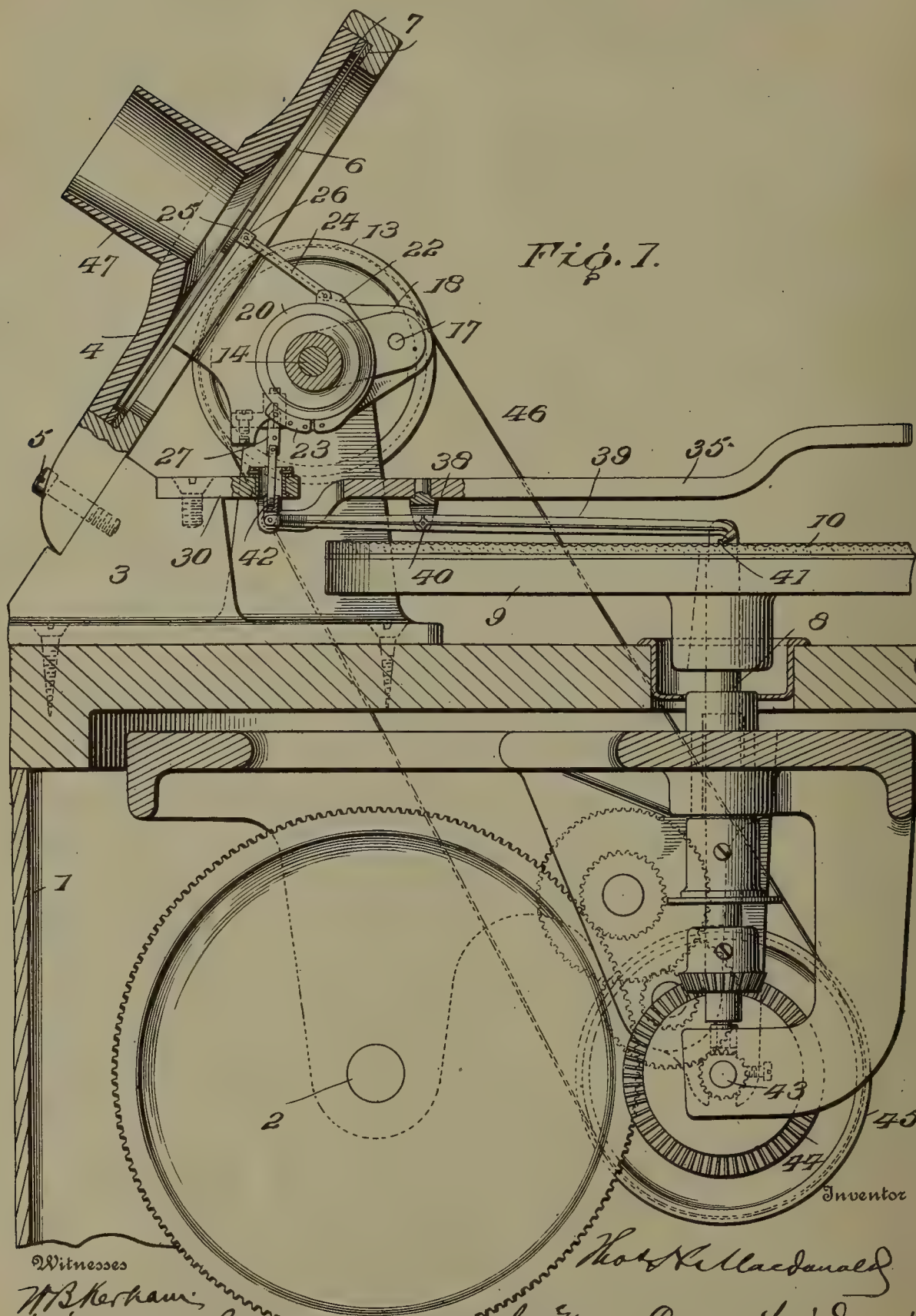
No. 877,207.

T. H. MACDONALD.
GRAPHOPHONE.

PATENTED JAN. 21, 1908.

APPLICATION FILED JAN. 16, 1908.

2 SHEETS—SHEET 1.



W. B. Sherman
Guylere K. Thompson.

Thos. H. Macdonald
by Morris Cameron Lamb Macdonald
Attorney

No. 877,207.

T. H. MACDONALD.
GRAPHOPHONE.

APPLICATION FILED JAN. 16, 1908.

PATENTED JAN. 21, 1908.

2 SHEETS—SHEET 2.

Fig. 2.

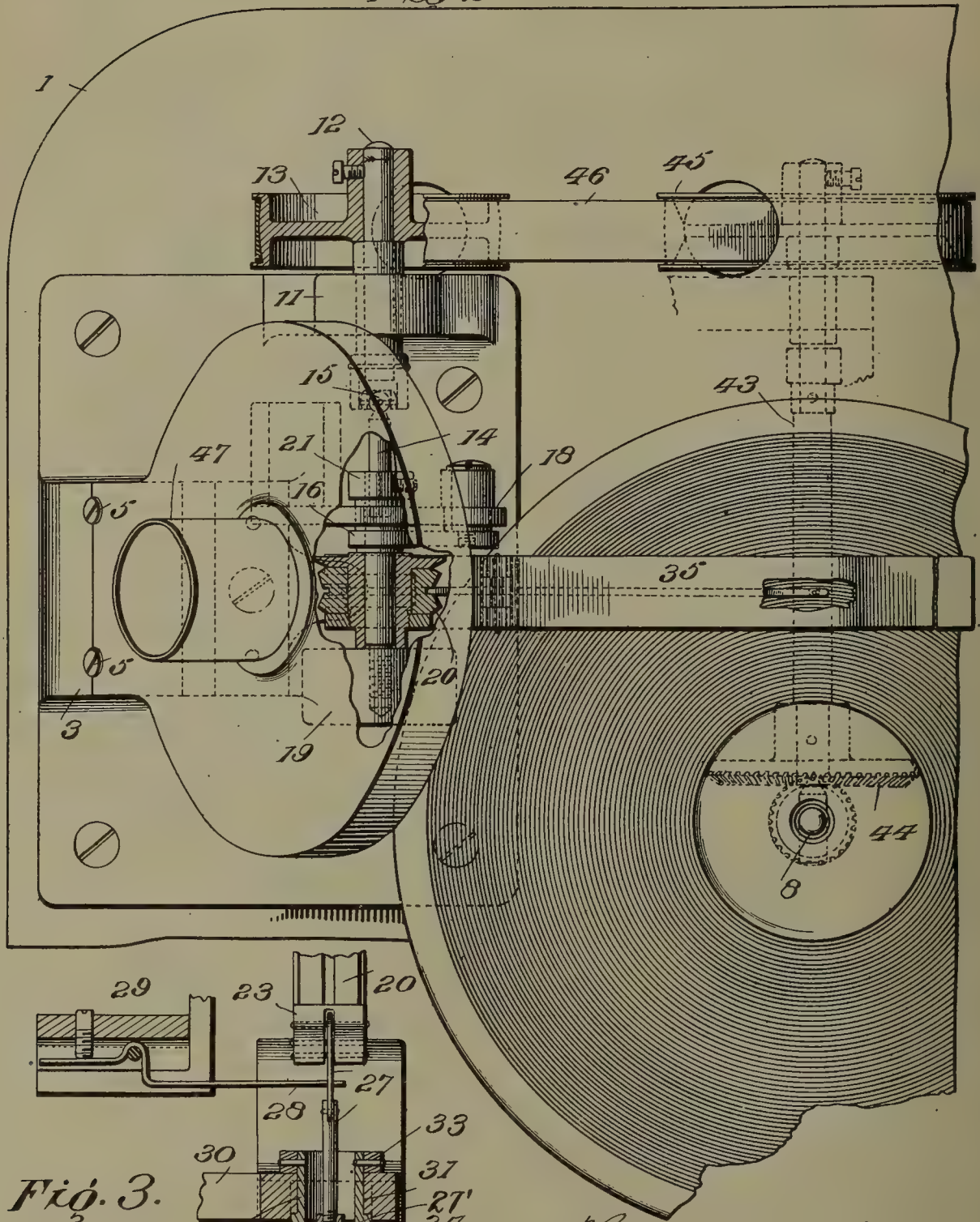
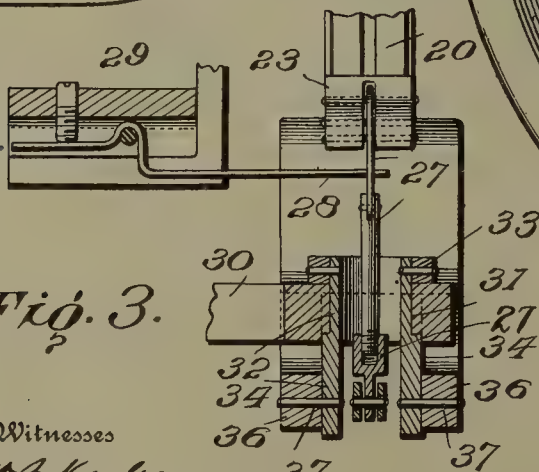


Fig. 3.



Witnesses

W. B. Kerkham;
Gustave R. Thompson.

Thos. H. Macdonald Inventor

By
E. Mearns Cameron Lewis & Inman
Attorneys

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

GRAPHOPHONE.

No. 877,207.

Specification of Letters Patent.

Patented Jan. 21, 1908.

Application filed January 16, 1906. Serial No. 296,366.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, of Bridgeport, Connecticut, have invented a new and useful Improvement in Graphophones, which invention is fully set forth in the following specification.

This invention relates to talking machines and more particularly to machines of this character in which the reproduction of sound is obtained from a disk-shaped or flat record tablet having a record groove thereon in the shape of a spiral upon the flat surface of the tablet, though certain features of the invention are applicable in connection with other forms of record.

In talking machines of the disk type the reproducer has heretofore been carried on the end of a hollow swinging arm, with the stylus of the reproducer resting in the record groove and the reproducer being moved bodily with the arm across the face of the record during the act of reproduction, the reproduced sound waves being conveyed to a suitable horn through the hollow arm. Furthermore, it has heretofore been proposed to employ in talking machines a relay device in the form of a friction roll and shoe between the stylus and diaphragm of the reproducer, the undulations of the record groove being utilized to govern the application of power for imparting vibrations to the diaphragm of the reproducer. So far as I am aware relay devices of this character have only been applied to machines employing cylindrical records and provided with means for moving the reproducer in a right line past the record during the act of reproduction.

One of the main objects of the present invention is to provide means whereby a relay device may be introduced between the stylus and diaphragm of the reproducer in connection with machines employing the flat or disk form of record, as distinguished from the cylindrical record.

A further object is to provide a disk machine wherein the reproducing diaphragm and its casing shall be fixed in position, thus doing away with the mechanism heretofore employed for moving these parts with relation to the record, and particularly doing away with the hollow reproducer-carrying arm heretofore universally employed.

With these objects in view the invention consists of a flat or disk record with mechanism for revolving the same in combination

with a reproducing diaphragm remaining in the same place or location throughout the act of reproduction, a reproducing stylus in operative relation with the record, and connections between said stylus and the diaphragm, a suitable relay device, as a friction roll and shoe, being introduced into or acting upon said connections.

The invention further consists in a fixed or permanently located reproducer diaphragm, a continuously driven friction roll, a friction shoe bearing on said roll and connected at its respective ends to the diaphragm and to a reproducing stylus bearing upon a flat disk-shaped or other style of record, and means for simultaneously revolving said record and friction shoe.

The invention further consists in certain details of construction which will be hereinafter more particularly described and then defined in the claims.

The inventive idea involved may receive a variety of mechanical expressions, one of which, for the purpose of illustrating the invention, is shown in the accompanying drawings, but it will be understood that such drawings are for the purpose of illustration only, and not for the purpose of defining the limits of the invention, reference being had to the claims for this purpose.

Referring to the drawings—Figure 1 is a detail vertical broken section, parts being shown in elevation; Fig. 2 is a broken plan view of the parts shown in Fig. 1, portions of the reproducer head being broken away and the friction roll shown in horizontal section; Fig. 3 is a detail vertical section showing the means of connecting the stylus-bearing parts with the friction shoe.

Referring to the drawings, in which like numerals indicate like parts, 1 is the usual or any suitable boxing or casing of a disk form of talking machine, such as the graphophone, within which boxing or casing the power mechanism for operating the parts is inclosed, power being transmitted from shaft 2. Mounted upon the top of the boxing 1 is a suitable bracket 3 upon which is the reproducer-head or casing 4 secured to the bracket in any suitable way, as by screws 5. Within the reproducer-head 4 there is mounted a diaphragm 6, preferably between suitable gaskets 7. Secured to a shaft 8 extending vertically through the top of the box is the tablet-holding table 9, upon which is placed

the record tablet 10. Turning in bearing 11 is a shaft 12 having keyed thereto a pulley 13. The inner end of said shaft 12 has an extension shaft 14 connected thereto by a ball and socket joint 15, Fig. 2, which extension shaft 14 extends in front of, and preferably slightly below the face of the diaphragm 6, and has bearing in a swinging arm 16 swinging on a pivot pin 17 carried in a fixed bearing lug or bracket 18 rigidly secured to the bracket-piece or plate 3. Preferably the extension shaft 14 passes through an opening (not shown) in the bracket-arm 18, and preferably also such extension shaft 14 is formed in two parts, the outer portion bearing a weight 19 and a friction roll 20 secured to and revolving with the shaft. The outer end of the shaft 14 is secured to the inner end thereof by a suitable coupling 21 so that the entire shaft 14 and the coupling 21, together with the weight 19 and the friction shoe 20 are free to swing about the joint 15, being supported in the swinging-arm 16. A friction shoe, preferably formed in two parts 22 and 23 suitably joined together, is in contact with the friction roll, one of the parts of the shoe, as 22, being pivotally connected by the link 24 to the diaphragm 6, such connection being preferably secured by means of a button 25 having a shank 26 which extends through an opening in the diaphragm, to which shank the link 24 is pivotally connected. The other portion 23 of the friction shoe has pivotally connected thereto a link 27, and a spring 28 acts through the link 27 to hold the shoe member 23 in contact with the friction roll 20, the tension of the spring 28 being adjustable in any suitable way, as by means of a screw 29, see Fig. 3. It will be understood that the spring 28 engages the link 27 as by passing through a hole therein.

Referring to Figs. 1 and 3, 30 is a bracket-arm extending outwardly, preferably from the bracket 3, in a horizontal direction, having the opening 31 therethrough, within which opening there is loosely mounted a sleeve 32 having a flange 33 taking bearing upon the upper surface of the bracket 30. Depending from the sleeve 32 and on opposite sides thereof, are two ears 34. A lever 35 of some considerable weight extends outwardly in a substantially horizontal position above the face of the record 10 and at its inner end is provided with forked arms 36—36, which are secured by trunnions 37 to the ears 34—34 of the sleeve 32, so that the lever 35 is free to move in a vertical plane around the trunnions 37, and also may be turned in a horizontal plane, the sleeve 32 turning in the opening 31 in bracket 30.

The lever 35 has depending from the under side thereof ears or lugs 38, see Fig. 1, and the stylus bar or lever 39 is connected to said lugs so as to rock in a vertical plane by a pivot pin 40, said stylus bar or lever bearing

at its outer end stylus 41 in contact with the record, and being connected at its other end by a suitable joint to the link 27, which link, as will be clearly seen from Fig. 3, extends downwardly through the sleeve 32. The connecting joint between the link 27 and the stylus lever 39 is one which leaves the stylus lever free to turn in a horizontal plane without affecting the link, but it will impart to the link all of the movements of the stylus lever in a vertical plane. Any suitable joint may be employed for this purpose, as for example the loose screw threaded connection between the link 27 and a socket 27' pivoted to the stylus bar as shown in Fig. 3, though the connection may be a ball and socket instead of a screw-thread connection, if desired.

The revolutions of the power shaft 2 are imparted to a shaft 43, Fig. 1, by a suitable train of gearing, which shaft 43, on its inner end, carries a bevel gear 44 meshing with a corresponding bevel gear on the shaft 8 for revolving the tablet, while the outer end of said shaft 43 carries a pulley 45, a belt 46 passing over the pulley 45 and the pulley 13, thereby revolving the shaft 12 and the friction roll and weight on the extension shaft 14.

Operation: The operator grasps the outer end of the weight lever 35, swings it so as to place the stylus 41 in the desired position on the record, and the motor being started the record 10 and the friction roll 20 are simultaneously revolved. As the record is revolved the stylus is carried across the face of the record by the action of the spiral groove, thereby carrying with it the weight lever 35 and the stylus bar or lever 39, both of which are turned in a horizontal plane around the joint made by the sleeve 32 and the bracket 30 for turning link 27. During the revolutions of the record the undulations of the latter (which, as here shown, are vertical undulations) impart up and down movements to the stylus end of the stylus lever 39, which vibrations are imparted to the link 27, which thereby acts to increase and decrease the friction of the friction shoe upon the friction roll in proportion to the amplitude of the vibrations, the friction roll thereby imparting to the diaphragm 6 corresponding vibrations but of magnified or increased amplitude. During this action shaft 14, with the link 18, is free to swing on pivot 17, thereby avoiding any undue strain upon the diaphragm through any excess of friction that might occur, the shaft 14 turning on the universal joint 15 to permit this swinging movement. The action of the friction roll and shoe with its swinging bearing and the weight attached thereto is substantially that occurring in talking machines above referred to employing the relay mechanism in connection with cylindrical tablets.

While the main object in the above de-

scribed invention is to provide a sound reproducing machine of the disk type with the relay feature consisting of the friction roll and shoe, there are certain features of the invention that are applicable to other forms of machines than the disk machine, and whenever in the accompanying claims the construction is not specifically limited to disk machines it is to be understood that other forms of record than the disk form are also in contemplation.

What is claimed is:—

1. In a sound reproducing machine, the combination of a revolving record, a stationary diaphragm, a stylus mounted to turn on a universal joint independent of said diaphragm, connections between said stylus and diaphragm, a friction device acting on said connections, and means simultaneously actuating said record and friction device.

2. In a sound reproducing machine, the combination of a record, with a diaphragm, a stylus mounted to move freely across said record independent of the diaphragm, connections between said stylus and diaphragm, a friction device acting on said connections, and means simultaneously actuating said record and friction device.

3. In a sound reproducing machine, the combination of a sound record, with a diaphragm, a stylus mounted to move across the face of the record independent of the diaphragm, a friction roll, connections between said stylus and diaphragm, one part of said connections constituting a friction shoe engaging said roll, and means simultaneously actuating said record and roll.

4. In a sound reproducing machine, the combination of a disk-shaped sound record, with a stationary diaphragm, an universally mounted stylus, a friction roll, connections between said stylus and diaphragm and having frictional engagement with said roll, and means simultaneously actuating said record and roll.

5. In a sound reproducing machine, the combination of a disk-shaped sound record, with a stationary diaphragm, a stylus mounted to move parallel with the face of said record and also at right angles thereto, a friction roll, connections between said stylus and diaphragm and having frictional bearing on said roll, and means simultaneously actuating said record and roll.

6. In a sound reproducing machine, the combination of a disk-shaped sound record, with a stylus mounted to swing freely across the face of the record and follow the record groove, a stationary diaphragm, a connection between said stylus and diaphragm, a friction device acting on said connections, and means simultaneously revolving said record and friction device.

7. In a sound reproducing machine, the combination of a stationary diaphragm cas-

ing or support, a diaphragm mounted therein, a flat or disk-shaped sound record, a stylus mounted to swing across said record, connections between said stylus and diaphragm, an intermediate friction device acting on said connections, and means simultaneously revolving said record and friction device.

8. In a sound reproducing machine, the combination of a stationary diaphragm casing or support, a diaphragm mounted therein, a flat or disk-shaped sound record, an universally mounted stylus in contact with said record, connections between said stylus and diaphragm, an intermediate friction device acting on said connections, and means simultaneously revolving said record and friction device.

9. In a sound reproducing machine, the combination of a stationary diaphragm casing or support, a diaphragm mounted therein, a flat or disk-shaped sound record, a stylus mounted to move across said record, connections between said stylus and diaphragm, a friction shoe constituting part of said connections, a friction roll in contact with said shoe, and means simultaneously revolving said record and roll.

10. In a sound reproducing machine, the combination of a stationary diaphragm support, a diaphragm mounted therein, a flat or disk-shaped sound record revoluble in a horizontal plane, a lever mounted to twing in a plane above said record, a stylus bar fulcrumed on said lever and carrying a stylus in contact with said record, connections between said lever and diaphragm, an intermediate friction device acting on said connections, and means simultaneously revolving said record and friction device.

11. In a sound reproducing machine, the combination of a record, a stationary diaphragm, a stylus-bar or lever, a friction roll, a friction shoe bearing on said roll, a link connecting one end of said shoe to the diaphragm, and a link connecting the other end of said shoe and the stylus-bar or lever, the joint between said link and said bar or lever leaving the lever free to turn in a direction parallel to the record tablet independent of the link but imparting to the link all movements of the lever normal to the record.

12. In a sound reproducing machine, the combination of a disk-shaped record, a stationary diaphragm, a weight-lever mounted on a universal joint, a stylus-bar fulcrumed on said weight-lever, a stylus carried by said stylus-bar, connections extending from the stylus-bar to said diaphragm, a friction shoe interposed in said connections, a friction roll in contact with said shoe, a swinging shaft on which said roll is mounted, and means simultaneously revolving said roll-shaft and record.

13. In a sound reproducing machine, the

combination of a sound record, a diaphragm, a friction device restrained from longitudinal movement, a reproducing stylus mounted with free movement so as to follow the record, connections between said stylus and the diaphragm, said connections being in frictional engagement with said friction device, and means revolving said record and friction device.

14. In a sound reproducing machine, the combination of a sound record and means for revolving the same, a diaphragm, a revolving friction device restrained from longitudinal movement, a weight mounted to swing in a substantially horizontal plane above the record, a stylus bar carried by said weight and having a stylus engaging the record, and connections between said bar and said diaphragm, which connections engage said friction device and also pass through the axis of said weight.

15. In a sound reproducing machine, the combination of a sound record, with a diaphragm, a friction roll mounted to swing to and from the diaphragm but restrained from longitudinal movement, a reproducing stylus engaging the record, connections from said stylus to the diaphragm in frictional engagement with said friction roll, and means revolving said record and roll.

16. In a sound reproducing machine, the combination of a sound record and means for revolving the same, with a stationary dia-

phragm, a revolving friction roll restrained from longitudinal movement, a weight pivoted to the framework of the machine so as to be capable of movement parallel with the record surface and also to and from the surface, a stylus bar carried by said weight having a stylus engaging the record, and connections between said stylus bar and said diaphragm, which connections pass through the axis of the horizontal movement of said weight, and make frictional contact with said friction roll.

17. In a sound reproducing machine, the combination of a sound record and means for revolving the same, a stationary diaphragm, a revolving friction device mounted to swing to and from said diaphragm but restrained from longitudinal movement, a stationary bracket, a sleeve hung to turn in a bearing in said bracket, a weight pivoted to said sleeve, a stylus bar fulcrumed on said weight and having a stylus engaging the record, and connections between said stylus and diaphragm, which connections are in frictional engagement with said friction device and pass through said sleeve.

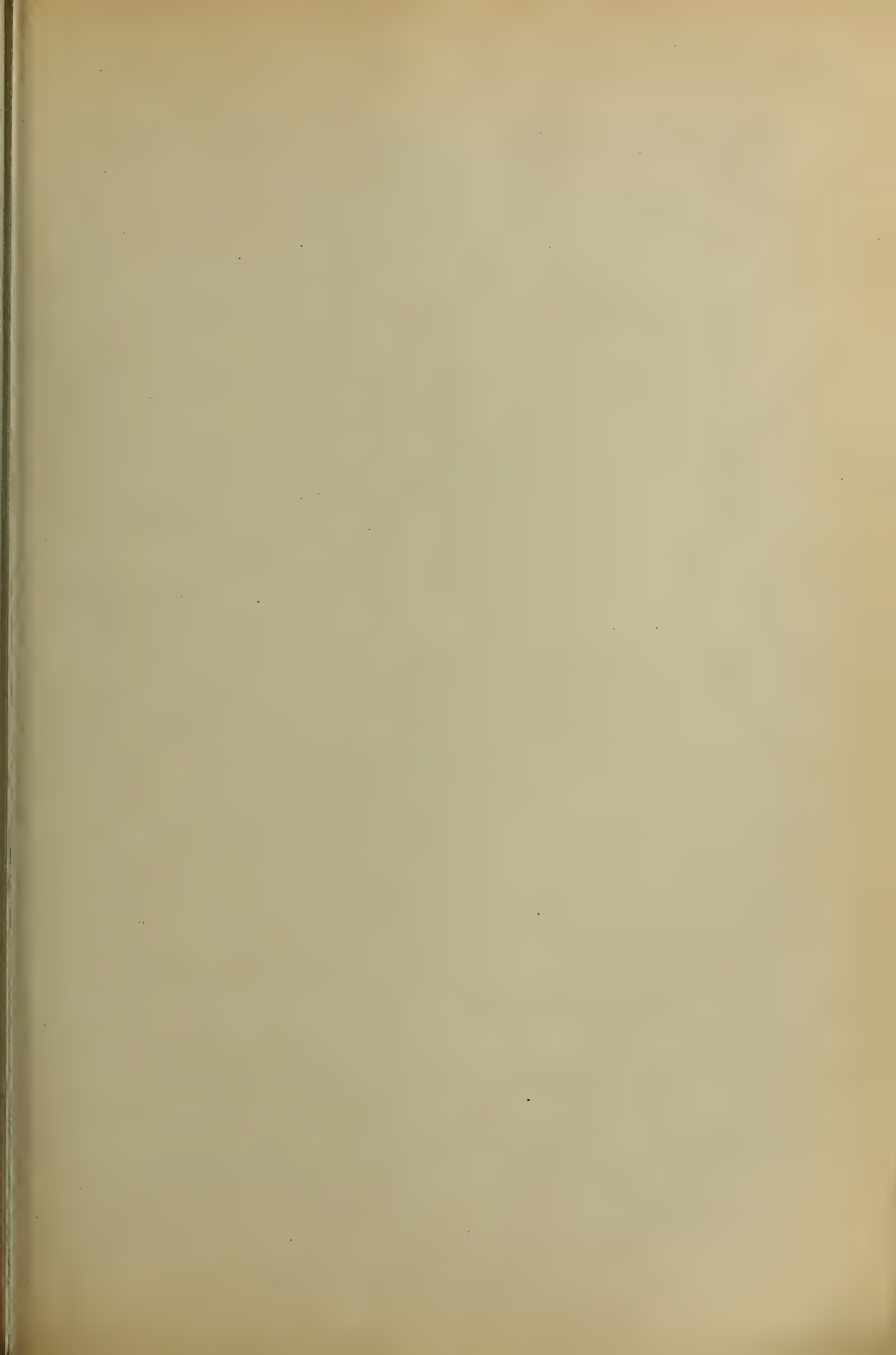
In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

A. B. KEOUGH,

C. A. GIBNER.



No. 877,327.

PATENTED JAN. 21, 1908.

C. F. GRAHAM.
SOUND PRODUCING MECHANISM.
APPLICATION FILED SEPT. 25, 1905.

Fig. 1.

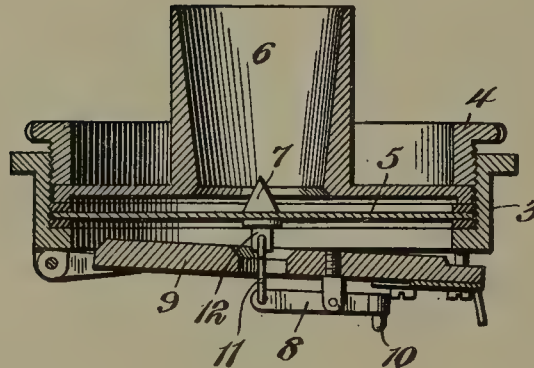
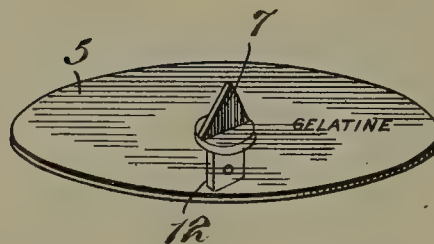


Fig. 2.



Witnesses

Howard D. Orr.

B. L. Foster.

C. F. Graham, Inventor,

By

E. J. Siggers.

Attorney

UNITED STATES PATENT OFFICE.

CHARLES F. GRAHAM, OF NEAR SELLERSBURG, INDIANA.

SOUND-PRODUCING MECHANISM.

No. 877,327.

Specification of Letters Patent.

Patented Jan. 21, 1908.

Application filed September 25, 1905. Serial No. 279,954.

To all whom it may concern:

BE it known that I, CHARLES F. GRAHAM, a citizen of the United States, residing at near Sellersburg, in the county of Clark and State of Indiana, have invented a new and useful Sound-Producing Mechanism, of which the following is a specification.

The present invention relates more particularly to diaphragms for sound-producing machines and by the term "sound-producing" machines, it is intended to include all of those types wherein diaphragms are employed for recording sounds or reproducing sounds already recorded. The principal object is to provide a simple device that will accurately produce and record sounds with clearness and without harsh or mechanical resonance, will permit the ready attachment thereto of the actuating or recording means without the necessity of any additional adhesive, and may be readily manufactured in any desirable shape.

The preferred embodiment of the invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a sectional view through a reproducer, showing the improved diaphragm in place. Fig. 2 is a perspective view of said diaphragm.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

In the embodiment illustrated, a reproducer box is employed, comprising threaded telescoped sections 3 and 4, that clamp between them a diaphragm 5, and a sound-conducting nipple 6, to which the usual tube may be attached. The diaphragm is preferably in the form of a disk that is made of gelatin or other similar mucilaginous material. The side that is disposed toward the nipple 6 has a centrally arranged triangular flat-sided projection 7, also formed of gelatin and attached thereto by the adhesive qualities of the material.

Carried by the boxing is the usual reproducing device, which, in the present embodiment comprises a lever 8 pivoted between its ends on a swinging support 9, one end of said lever having a stylus 10, the other being connected by a link 11 to a post 12. The post

12 is fastened to the central portion of the face of the diaphragm disk opposite to that carrying the projection 7, and the holding means employed is merely the adhesive properties of the gelatin. In other words, all that is necessary to attach the post is to moisten the gelatin and apply said post. The gelatin soon drying, securely holds said post in place.

Experience has demonstrated that by means of this diaphragm, tones are produced that are as loud as the diaphragms ordinarily employed and that harsh and mechanical sounds are eliminated. The tones, moreover, are melodious and natural as well as clear and distinct. Furthermore, it is very easy to attach the parts to the diaphragm, as there is no necessity to employ extraneous adhesives.

From the foregoing it is thought that the construction, operation, and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus described my invention what I claim as new and desire to secure by Letters Patent, is:

1. In sound-producing mechanism, a diaphragm comprising a gelatiniform plate, and a centrally disposed gelatiniform projection having a surface engagement with one face of the plate, and secured thereto by the adhesive properties of the material comprising the plate and projection.

2. In sound-producing mechanism, a diaphragm comprising a disk composed of gelatin, a centrally disposed triangular projection carried by one face of the disk, and a reproducing device having a connection with the other face of the disk.

3. In sound-producing mechanism, a diaphragm comprising a gelatiniform plate, and a reproducing device having a surface connected with the diaphragm by the adhesive properties of the same.

4. In sound-producing mechanism, a dia-

phragm comprising a disk composed of gelatin, a centrally disposed triangular projection carried by one face of the disk, and a reproducing device including a post having a
5 surface connection with the diaphragm by the adhesive properties of the gelatin composing the same.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

CHARLES F. GRAHAM.

Witnesses:

EDWARD G. HENRY,
JOHN K. GRAHAM.



No. 877,842.

PATENTED JAN. 28, 1908.

J. M. HIGLEY.
TALKING MACHINE DISK PROTECTOR.

APPLICATION FILED JULY 2, 1907.

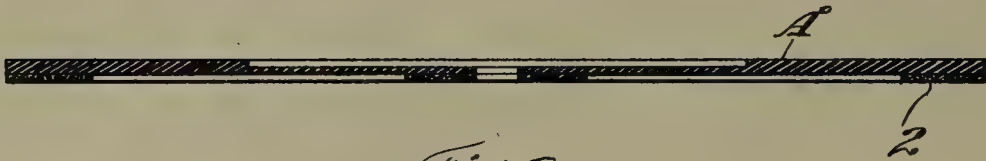


Fig. 2.

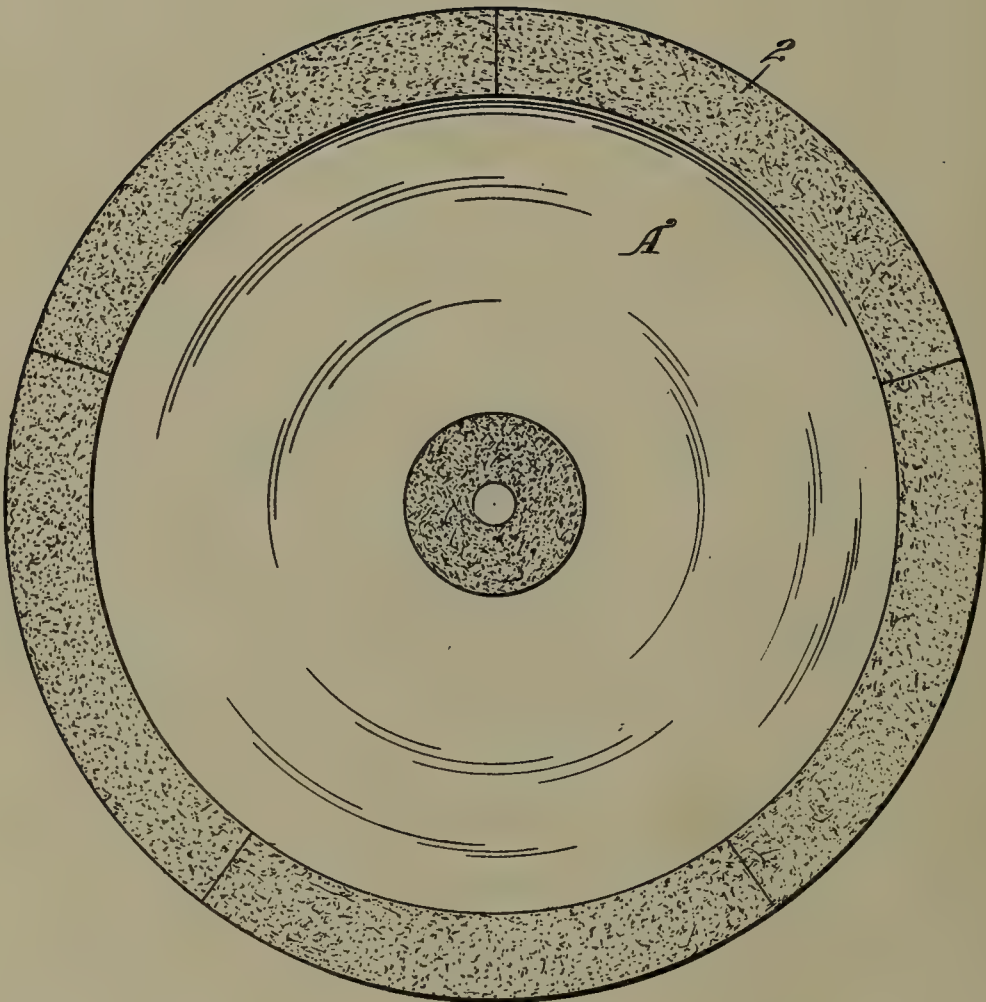


Fig. 1.

WITNESSES

C. E. Morse
J. H. Morse

INVENTOR:

Jessie M. Higley;

BY *Geo. H. Strong*

ATTORNEY

UNITED STATES PATENT OFFICE.

JESSIE M. HIGLEY, OF NILES, CALIFORNIA.

TALKING-MACHINE-DISK PROTECTOR.

No. 877,842.

Specification of Letters Patent.

Patented Jan. 28, 1908.

Application filed July 2, 1907. Serial No. 381,882.

To all whom it may concern:

Be it known that I, JESSIE M. HIGLEY, citizen of United States, residing at Niles, in the county of Alameda and State of California, have invented new and useful Improvements in Talking-Machine-Disk Protectors, of which the following is a specification.

My invention relates to a protective device for talking machine disks.

It consists of soft felt or equivalent attachment placed upon the back of the disk, and in details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a plan view. Fig. 2 is a sectional elevation of my invention.

The records of talking and like machines which are made upon flat, hard rubber disks, are usually kept in quantity by piling one upon the top of the other, and careless handling of these disks often mutilates them to the extent of sometimes ruining them altogether; and in any event they are soon rendered unsatisfactory by such bruises.

It is the object of my invention to provide a means for protecting such disks without in any way interfering with their use.

The disk A has the upper surface forming the record. Upon the lower or back surface I fix narrow rings 2 of cloth, felt or other equivalent soft material, which has sufficient thickness to prevent the disk upon which it is fixed from making a direct contact of the hard portions with the disk below; but at the same time this protective part is not thick enough to interfere with the proper placing of the disk upon the machine.

As the disks are of very considerable diameter, it will be manifest that if the material used was to be stamped or cut out of large pieces, there would be a good deal of waste. I have therefore designed to cut the material, if used in circular form, into segments which will take but a small width of material for each segment, and thus economize the material to the utmost. In the drawing these segments are shown of such

size that the amount of material used for each segment will be but little more than the actual width of the segment itself. These are pasted or otherwise secured so as to form an annular ring around the periphery, and if found desirable, a second ring may be formed around the central portion.

With this device it is possible to superpose any number of these disks without any danger of marring the surfaces of the lowermost ones.

The surface thus carried by the disk may also serve in lieu of the felt disk which is usually fixed to the revolving table upon which the disk is carried, and to which the disk is adherent.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. A record for a talking machine having a protective medium permanently secured to its exterior surface and serving to protect superposed records from direct contact with each other.

2. A record for a talking machine having an annular ring permanently secured to its exterior surface and serving to protect superposed records from direct contact with each other.

3. A talking machine record of disk-form having an annular ring fixed to the exterior thereof and serving to protect the record side of a second disk when two disks are placed flatwise together, said ring being formed of separate sections.

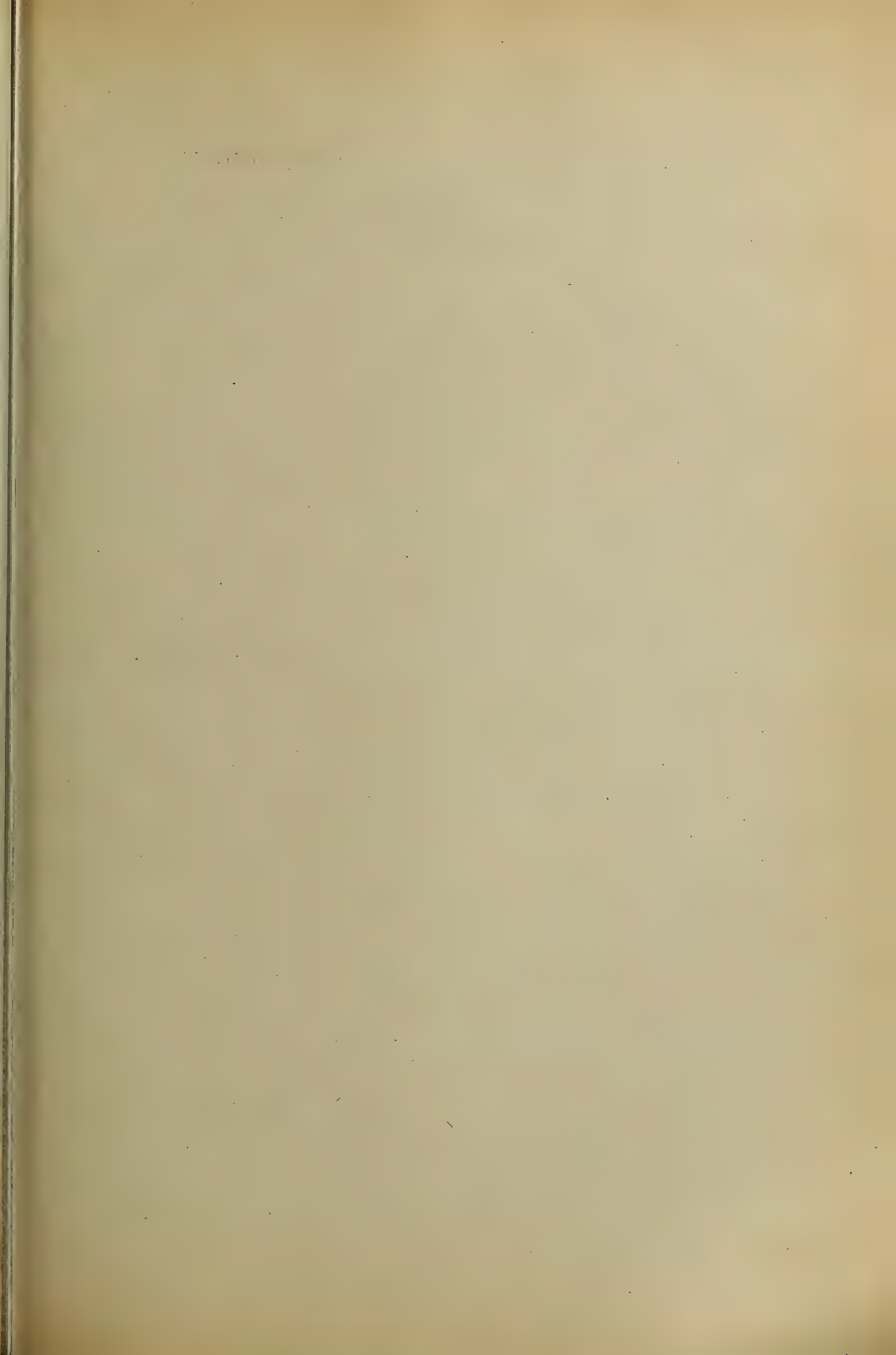
4. A talking machine record of disk-form having permanently attached to its surface opposite to that containing the record a soft surface of material having a slightly adherent character.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JESSIE M. HIGLEY.

Witnesses:

S. H. NOURSE,
FREDERICK E. MAYNARD.



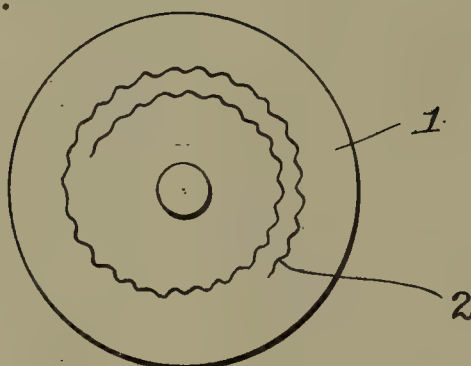
No. 877,845

PATENTED JAN. 28, 1908.

I. KITSEE.
PHONOGRAPHY.

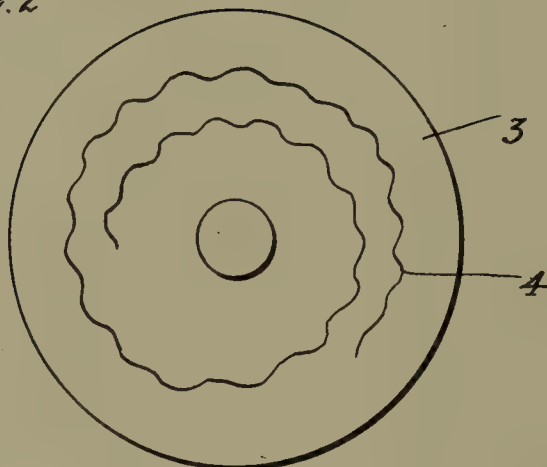
APPLICATION FILED AUG. 1, 1907.

Fig. 1.



ORIGINAL TRANSPARENT RECORD

Fig. 2



SOUND AMPLIFYING RECORD

WITNESSES:

Edith R. Stillee
Mary C. Smith

INVENTOR.

I. Kitsee

UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA.

PHONOGRAPHY.

No. 877,845.

Specification of Letters Patent.

Patented Jan. 28, 1908.

Application filed August 1, 1907. Serial No. 386,676.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Phonography, of which the following is a specification.

My invention relates to an improvement in phonography.

10 Its object is to increase the efficiency of phonographic records by producing them in such manner as to impart thereto capacity for amplifying the sound in the reproduction of the sound waves, and thereby overcoming
15 the necessity for employing mechanical devices to obtain such amplification.

The underlying principle of my invention consists in the enlargement of the original record and also in the production of copies
20 from said enlargement.

In the drawings, Figure 1 is a plan view conventionally illustrating an original transparent record. Fig. 2 is a similar view of a sound amplifying copy of the record disclosed in Fig. 1.
25

The mode of procedure is as follows:—

I, first, produce the original record in a manner, so that the same can be photographed. I, preferably, produce the original
30 record on a material transparent to the rays of light with a material opaque to said rays. A glass plate, or a sheet of tracing cloth, is well adapted for the purpose in question, and the lines representing the sound waves may
35 be traced thereon with a colored crayon, or a free flowing colored liquid.

The so produced original record is then subjected to an enlargement process with the aid of photography; that is, an enlarged
40 photographic copy is taken from the original. I do not need to describe here the method of taking enlarged photographic copies from originals, as this process is well understood by persons versed in the art.

45 The plate on which the enlarged copy is produced is, preferably, of a material transparent to the rays of light, and as the photographed phonographic lines are opaque to the rays of light, it is obvious that this enlarged copy can be used in the same manner
50 as the original may be used if enlarged copies were not necessary. From these enlarged copies, I produce commercial copies,—by preference,—with the aid of the photo-gravure process, a process which is well understood
55 by persons practicing the art.

By way of illustration of the hereindescribed invention, I have shown conventionally in Fig. 1 an original transparent record, the numeral 1 designating the body thereof, 60 and 2 the lines representing the sound waves, while in Fig. 2 is shown a sound amplifying copy. In the latter the numeral 3 designates the body of the record and 4 the amplifying lines.
65

The great advantage of being able to have commercial copies which reproduce the sound waves in an enlarged volume and with greater force is readily appreciated, and with the above described method, it lies in the
70 power of the person producing the original and copies to so enlarge the original that any volume of sound may be produced from the commercial copy. It will thus be seen that the present invention enables commercial
75 records to be produced capable of amplifying the sound, or increasing the volume of sound over the original records, and thus the necessity for employing mechanical devices for obtaining such amplification is entirely
80 overcome.

Having now described my invention, what I claim as new and desire to secure by letters Patent is:—

1. The method of producing phonographic
85 records capable of amplifying the sound volume of the originals, consisting in first obtaining an enlarged photographic copy from the original record, and then producing commercial copies from said enlarged copy.
90

2. The method of producing phonographic records capable of amplifying the sound volume of the originals, consisting in first producing the original record upon a transparent base by outlining the sound waves thereon
95 through the medium of an opaque material, enlarging photographically the record so produced, and then producing commercial copies from the enlargement of the original.

3. The method of producing phonographic
100 records capable of amplifying the sound volume of the originals, consisting in first producing the original record upon a transparent base by depositing thereon an opaque material in outline of the sound waves, enlarging
105 ing photographically the record so produced,

and then producing commercial copies from the enlargement of the original.

4. The method of producing phonographic
5 records capable of amplifying the sound volume of the originals, consisting in first producing the original record upon a transparent base by imparting to the latter an opaque outline conforming to the sound waves, enlarging photographically the record so pro-

duced, and then producing commercial copies from the enlargement of the original.

In testimony whereof I affix my signature in presence of two witnesses.

ISIDOR KITSEE.

Witnesses:

EDITH R. STILLEY,
MARY C. SMITH

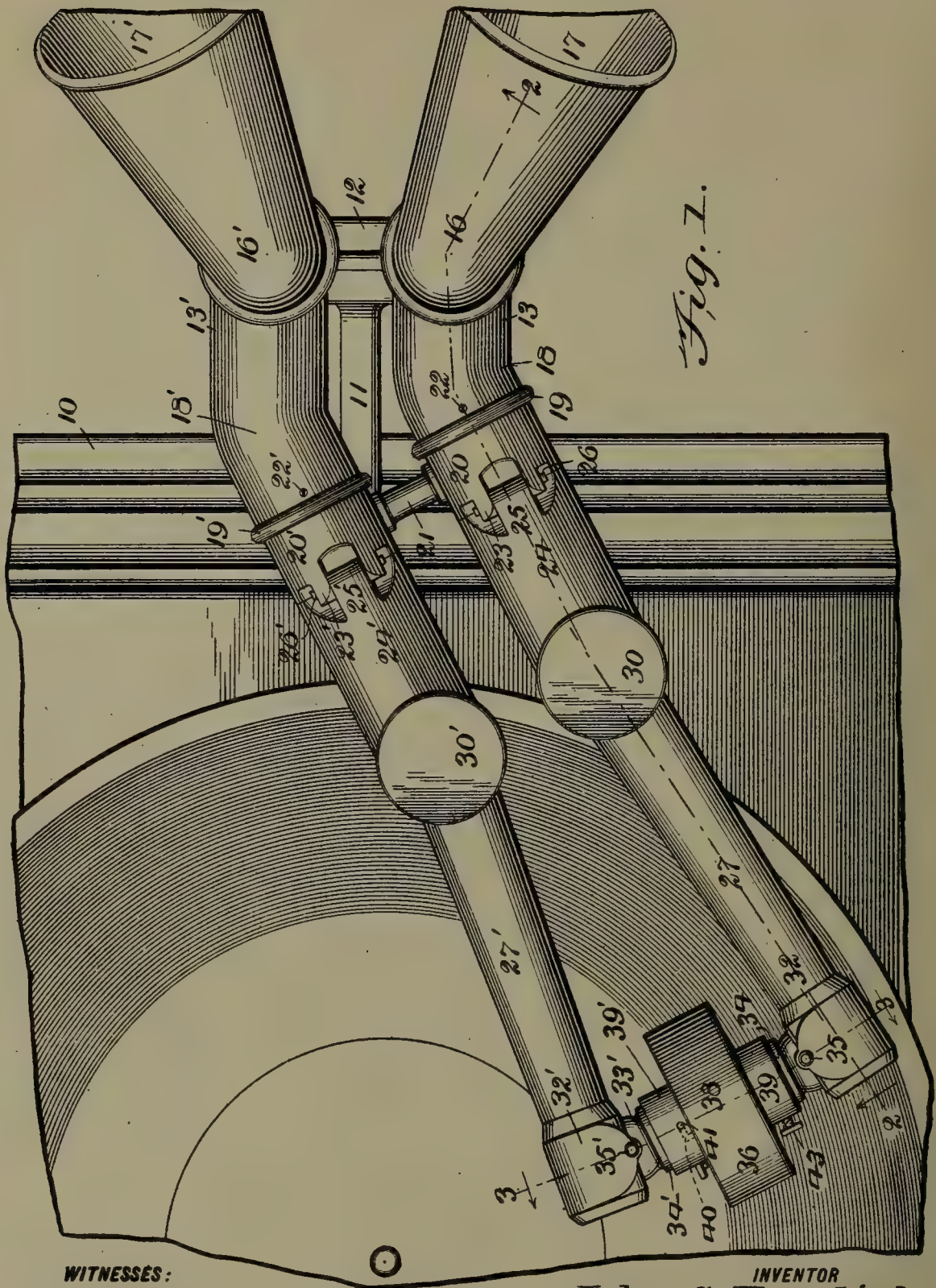
No. 877,989.

PATENTED FEB. 4, 1908.

J. C. ENGLISH.
TALKING MACHINE.

APPLICATION FILED SEPT. 11, 1905.

2 SHEETS—SHEET 1.



WITNESSES:

J. C. Barry
Edu. W. Vail Jr.

INVENTOR

John C. English

BY

10me. Peters.
ATTORNEY.

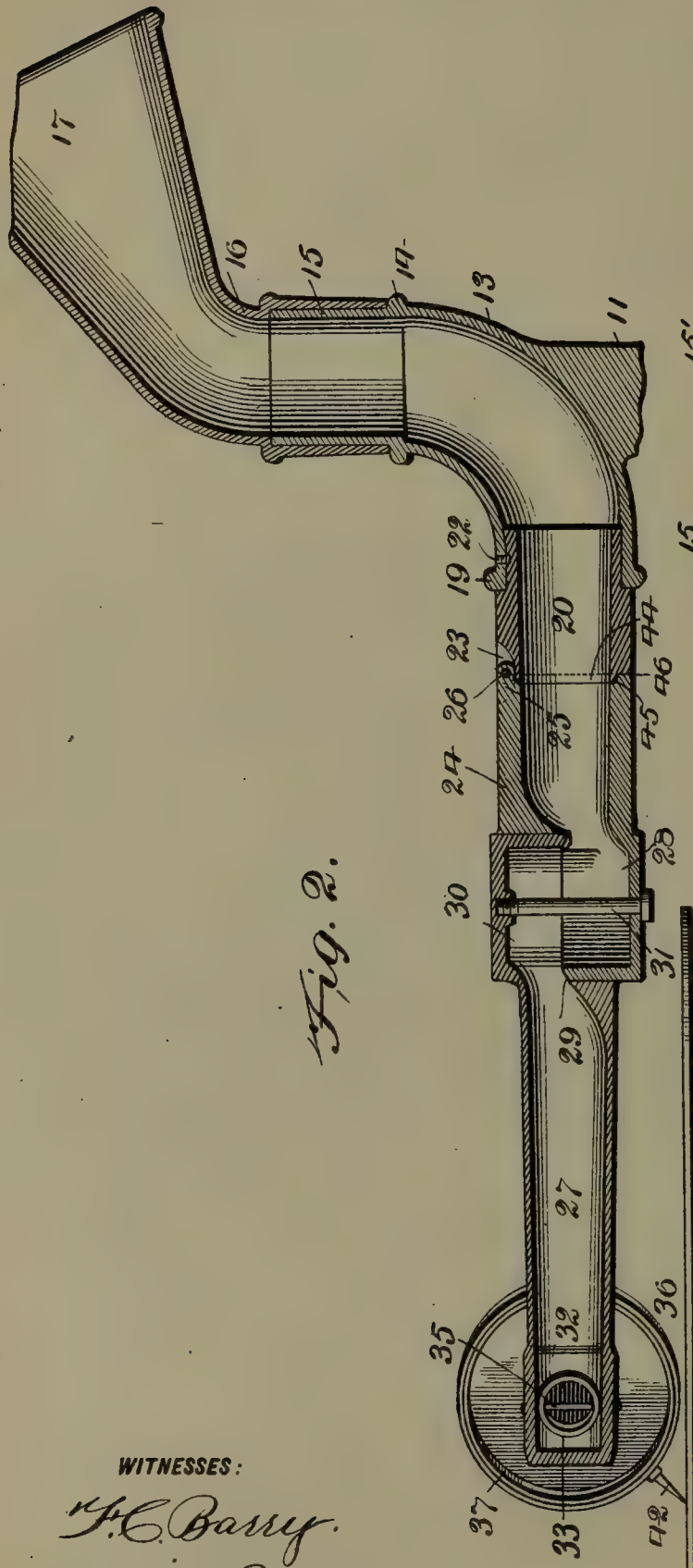


Fig. 2.

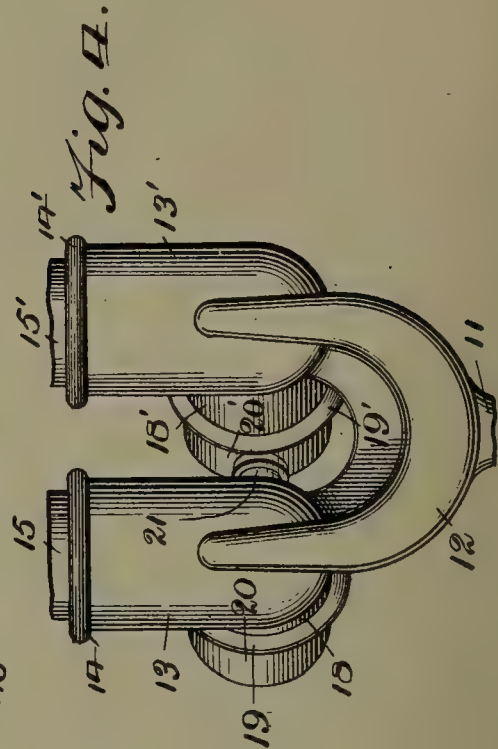


Fig. 4.

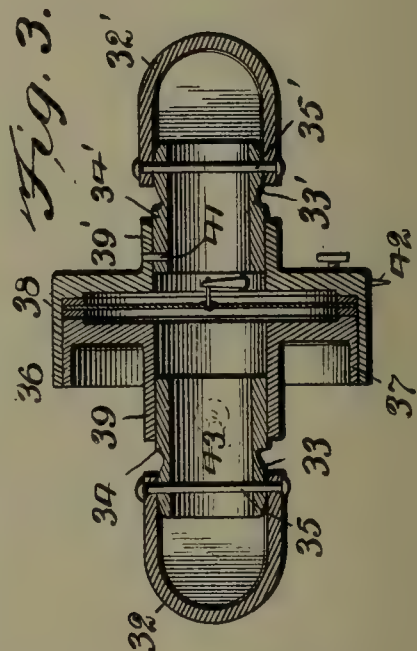


Fig. 3.

WITNESSES:

J. C. Barry.
Edw. W. Vaile Jr.

INVENTOR
John C. English
BY
10me Peltz.
ATTORNEY.

UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY.

TALKING-MACHINE.

No. 877,989.

Specification of Letters Patent.

Patented Feb. 4, 1908.

Application filed September 11, 1905. Serial No. 277,805.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and resident of the city of Camden, State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a full, clear, and complete disclosure.

One object of my invention is to provide a construction in connection with talking machines, whereby the plane of the stylus, which is perpendicular to the record and at right angles to the axis of the reproducer sound box, is maintained at all times substantially tangential to the direction of the rotation of the turn-table and consequently to the grooves of a disk record.

A further object of my invention is to so construct the above described means that it performs the additional function of taking of vibrations from both sides of the diaphragm to produce thereby a more exact reproduction of the record.

A further object of my invention is to convey the sounds from opposite sides of the sound box to two independent arms or other sound augmenting devices whereby the resulting reproduction is louder, clearer and more faithful to the original sounds or tones recorded than has hitherto been obtained.

A further object of my invention is to mount each horn or other sound augmenting devices in such a manner that it may be turned or swung at different angles with respect to the other in order to distribute the sounds in a manner to produce the best and most effective results.

A further object of my invention is to make the sound tubes, the sound box, and the parts connected thereto of such proportions that the said parts are sufficiently rigid to resist the tendency to vibrate in sympathy with the vibrations of the air inclosed thereby, and therefore from imparting their own vibrations and undesirable qualities to the sound which is being reproduced. In other words, the parts are made so heavy that they do not partake of the vibrations of the air inclosed, but permit the vibrations from the diaphragm to be transmitted through the same in a much more perfect manner than has heretofore been accomplished.

Briefly, my invention consists in providing a talking machine with two sound con-

veying tubes of heavy and rigid construction, each of which is composed of a rigid or fixed portion secured to the side of a cabinet, or other fixed part of a talking machine, and two hinged portions free to be swung upwardly on horizontal pivots away from the plane of the record, and also to be swung about vertical pivots in a horizontal plane over the face of the record; the swinging ends of said sound tubes being pivoted to the opposite sides of the reproducer or sound box; whereby the said sound tubes are caused to convey the vibrations of the diaphragm from both sides of the sound box to independently movable horns or any other sound amplifying device, and at the same time to maintain the sound box, and the stylus carried thereby, in a fixed relation with respect to the groove of the record as the reproducer or sound box travels across the same.

For a full, clear and exact description of one embodiment of my invention, reference may be had to the accompanying drawings forming a part thereof, in which

Figure 1 is a plan view of my improved device, mounted upon a cabinet of a talking machine. Fig. 2 is a sectional view of the line 2, 2, Fig. 1; Fig. 3 is a section of the line 3, 3, Fig. 1; Fig. 4 is an elevation view of the bracket or fixed support of my device.

Referring to the drawings, 10 indicates the cabinet of a talking machine to one side of which a bracket is rigidly secured. The bracket (plainly shown in Figs. 1 and 4) consists of a web 11, terminating in a U shaped yoke 12, the upper arms of which are provided with elbows 13, 13', forming parts of the sound conveying tubes. The upper ends of the elbows are provided with shoulders, 14, 14', and upwardly projecting cylindrical sleeves 15, 15' which are adapted to smoothly fit the smaller ends 16, 16' of the sound amplifying horns 17, 17'. By means of this connection between the horns and the upper ends 15, 15' of the rigid elbows 13, 13', the horns may be independently swung around in a horizontal plane to form any desired angle with respect to each other and to distribute the sound in a much more perfect and effective manner than has heretofore been accomplished. The elbows 13, 13' extend backwardly for a short distance toward the center of the talking machine, are then bent as at 18, 18' and terminate in flanges 19, 19'.

Within the inner ends of the elbows 13, 13' are sleeved short tubes 20, 20', rigidly united by cross-bar 21 and secured within the elbow by set screws, 22, 22'. Each tube 20, 20' is provided on its upper side with lugs 23, 23' forming parts of a hinge, to which extensions 24, 24' are secured by lugs 25, 25' and pivot 26, 26'. To the other ends of the extensions 24, 24' are pivoted the tubular horizontally swinging arms 27, 27', of the sound tubes, the connection between the said swinging arms and the extensions being clearly shown in Fig. 2, in which said extensions 24—24' are each provided with a hollow, vertically disposed cylindrical portion 28, beveled on top as at 29, while the horizontal swinging arm 27—27' each have a similar cylindrical portion 30, the lower edge of which is beveled to correspond to the beveled edge 29. A screw 31, securely clamps said cylindrical portions together, but permits the arm 27 to swing in a horizontal plane around the pin 31, as a pivot, as Figs. 1 and 2 plainly illustrate. One end of each horizontal swinging arm 27, 27' is enlarged as at 32, 32', and the adjacent sides of said enlargement are provided with openings within which the spherically shaped ends 33, 33', of the connections 34, 34', are secured by vertical pins 35, 35'.

The reproducer sound box 36 differs from the usual construction of the same in that both the interior cylindrical portion 37, and the exterior cylindrical portion 38, are provided with outwardly extending cylindrical sleeves 39, 39' respectively, and within said sleeves the connecting tubes 34, 34' are fitted. The connection 34' and sleeve 39' are secured together by a bayonet slot 40, and pin 41, by means of which the stylus 42 is quickly and accurately adjusted so that its axis forms the proper or correct angle with the face of the record. The other connection, 34, is secured to the sleeve 39 by means of a set screw, 43.

In order to permit the extensions 24, 24' to be swung upwardly on their horizontal pivots 26, 26' and yet to form a tight connection between said extensions and the short tubes when the arms are in their horizontal position, I have provided the short tubes 20, 20' with flanges, the outer surfaces of which are curved to conform to an arc, the center of which is in a line through the axis of the pivots 26, 26'. The connection between the short tube 20 and the extension 24 is plainly shown in Fig. 2, and is identical with that for the short tube 20' and the extension 24'. In said Fig. 2, 44 represents the flange on the short tube 20, and its outer surface 45 from the shoulder 46 to the top of the flange is curved in a vertical plane to form an arc of a circle swung from pivot 26. As will be seen, I have provided the extension 24 with a corresponding recess, within which the flange 44 fits. The horizontal pivots 26 then permit

the sound box mounted on the inner ends of the sound conveying tubes to be lifted for any purpose as for instance, for inserting or replacing the stylus, while the flanges 44 permit the sound box and inner ends of the sound conveying tubes to oscillate slightly, without binding and without breaking the continuity of the sound conveying tube, to conform to any inequalities or irregularities of the surface of the record.

In order to maintain the plane of the stylus substantially tangential to the groove as the stylus is swung on an arc over the record, I have made the pivots at each end of the tubes substantially at the corners of a parallelogram. In actual practice, however, I have found that the distance between the axes of the cylindrical portions 30, 30' should be slightly less than that between the pivots 35, 35', connecting the outer end of the swinging arms with the connecting tubes 34, 34' and by reason of this shortening of one side of the parallelogram, the axis of the sound box or reproducer is not maintained at all times absolutely parallel to a determined vertical plane as would be the case if said distances were equal, but the direction of the said axis is slightly changed as the reproducer travels over the record. By a careful determination of the relation of the distances between said pivots, the plane of the stylus is maintained at all times in approximately perfect relation to the grooves in the record. In addition, then, to performing the function of taking the vibrations from both sides of the diaphragm, my sound conveying tubes also operate to so change the direction of the axis of the sound box that the stylus is always in a plane substantially tangential to the groove of the record, and as a result of the combination of these two features in one structure the sound is reproduced with greater intensity and accuracy than has heretofore been possible in ordinary forms of construction. It will be also observed that I have made the arms, and connections of a very firm and rigid construction, and by reason of this and the manner of securing them together and to the fixed parts of the machine to mutually strengthen and firmly hold each other, the vibrations produced by the diaphragm are not transmitted through the material of the sound tubes, but only through the air inclosed in the tubes. In other words, by making the construction of my parts exceedingly rigid and practically non-vibratory, I have been enabled to limit the transmission of vibrations to the air inclosed in the tubes, and the vibrations are not imparted to or transmitted through, the connected parts of the machine, with the result that the tones originally recorded upon the record are reproduced with great accuracy and purity.

Should it for any reason be found desirable

to remove the sound box, it is only necessary to loosen the set screw 43 and turn the sound box to allow the pin 41 to be withdrawn from the bayonet joint 40. Thus I have provided
 5 the stylus of a double armed talking machine with the accurate adjustment afforded by the bayonet joint and pin heretofore employed in connection with single rigid arm sound tubes.

10 Having thus described one embodiment of my invention, what I claim and desire to protect by Letters Patent of the United States, is:—

1. In a talking machine, the combination
 15 with the sound box and stylus, of means for maintaining the plane of the stylus substantially tangential to the record grooves as the sound box swings across the record and for taking vibrations from each side of the
 20 sound box.

2. In a talking machine the combination in a single structure of means for taking the vibrations from each side of the sound box and for maintaining the plane of the stylus substantially tangential to the record
 25 grooves as the sound box swings across the record.

3. In a talking machine, the combination with the sound box and stylus, of means for
 30 taking vibrations from each side of a sound box and maintaining the plane of the stylus substantially tangential to the record grooves as the sound box swings across the record, the said parts being of heavy and
 35 rigid construction to limit the transmission of vibrations to the air confined in said tubes.

4. In a talking machine, the combination with a sound box and stylus, of pivoted
 40 sound tubes connected with the sides of the sound box for taking vibrations from each side thereof and for maintaining the plane of the stylus substantially tangential to the record grooves as the sound box swings across the record.

5. In a talking machine, the combination with a sound box of a plurality of swinging
 45 reproducer arms independently pivoted to opposite sides of said reproducer and to a fixed part of the machine.

6. In a talking machine, the combination
 50 of a reproducer and a swinging reproducer arm secured to said reproducer and to a fixed part of said machine, said reproducer and arm being of heavy and rigid construction
 55 to prevent said parts from vibrating in sympathy with the diaphragm.

7. In a talking machine the combination with a reproducer, two swinging reproducer
 60 arms independently pivoted at one end to a fixed part of the machine and having their opposite ends pivoted to the opposite sides of said reproducer, the said reproducer and arms being of heavy and rigid construction to prevent sympathetic vibrations therein.

8. In a talking machine, the combination

with a reproducer and a swinging reproducer arm mounted on a stationary pivot, a second
 swinging reproducer arm mounted on a similar but independent stationary pivot, means
 70 for pivoting the outer ends of said arms to the sides of said reproducer for taking vibrations from each side of said reproducer and for maintaining the plane of the stylus substantially tangential to the record groove as the reproducer moves across the record.

9. In a sound recording or reproducing
 75 machine the combination with a reproducer, of a sound conveying arm pivoted at one end to a stationary part of the machine and having its other end in communication with and
 80 pivoted to one side of said reproducer, a second sound conveying arm mounted similarly to the first mentioned arm and having its corresponding end communicating with and
 85 pivoted to the opposite side of said reproducer, the relative positions between said pivots and said pivoted ends of said arms being substantially at the corners of a parallelogram.

10. In a talking machine, the combination
 90 with a reproducer having a stylus, of a tube pivoted to one end of the stationary part of the machine and having its other end connected with one side of said reproducer; a second tube mounted similarly to the first
 95 tube and having its corresponding end connected with the opposite side of said reproducer, the relative positions between said pivots and said pivoted ends of said tube being substantially at the corners of a parallelogram, the outer end of which is slightly
 100 greater than the inner end.

11. In a sound recording and reproducing
 machine, the combination with a reproducer, of two sound conveying arms having their
 105 outer ends respectively communicating with and pivotally connected to the opposite sides of said reproducer and having their inner ends mounted to swing on horizontal pivots, to maintain the stylus in a plane sub-
 110 stantially tangential to the record groove.

12. In a talking machine the combination with a reproducer, of two sound conveying
 tubes pivoted on opposite sides of said reproducer, and means for oscillating the inner
 115 ends of said sound conveying tubes, said means consisting of a horizontal pivot, a flange, the outer surface of which is curved to conform to the arc of a circle struck from the axis of said pivot and a recess on the
 120 movable portion of said tube to cooperate with said flange.

13. In a talking machine, the combination with a sound box having lateral extensions
 125 on each side of the diaphragm, the tubular connections sleeved within said extensions, one extension being secured to said tubular connection by a bayonet joint which positions the stylus, and the other extension being secured to the other tubular connection
 130

by set-screw, and two horizontal swinging reproducer arms pivotally connected to said extensions.

14. In a talking machine, the combination
5 with the reproducer, of sound conveying tubes connected to the opposite sides of said reproducer, and a horn connected with each
10 of said sound conveying tubes each horn being mounted to swing in a substantially horizontal plane independently of the sound conveying tubes and each other.

15. In a talking machine, the combination
15 with a reproducer, of sound conveying tubes, connected at their inner ends to the opposite sides of said reproducer, and mounted to maintain the reproducer at all times substantially tangential to the record groove,
20 and a horn, mounted on the outer end of each sound tube, adapted to be swung horizontally in any direction.

16. In a talking machine, the combination
25 with a reproducer, of two sound conveying tubes, connected to opposite sides of said reproducer, the said tubes being mounted to maintain the reproducer at all times substantially tangential to the record groove, the
30 outer ends of said tubes being provided with independent horizontally swinging horns.

17. In a talking machine, the combination
30 with the stylus, and a sound box having an inclosed diaphragm, sleeves extending outwardly from said diaphragm, and connections secured within said sleeves; of means
35 located on one of said connections for accurately determining the position of said stylus; and a sound tube pivotally secured to each said connection.

18. In a talking machine, the combination
40 with the stylus, and a sound box having an inclosed diaphragm, outwardly extending sleeves, and connections provided with spherically shaped ends secured within said

sleeves; of means located on one side of said connections for accurately determining the position of said stylus; and swinging sound
45 tubes having their movable ends pivoted to the spherical ends of said connections, and their other ends independently pivoted to a fixed part of the machine.

19. In a sound recording and reproducing
50 machine, the combination with a sound box, of a plurality of sound conveying arms connected thereto and pivoted to maintain the stylus in a plane substantially tangential to the record groove.
55

20. In a sound recording and reproducing machine, the combination with a sound box,
60 of a pair of sound conveying arms communicating therewith, the said sound box being mounted to move in a direction transverse to the face of the record.

21. In a sound recording and reproducing machine, the combination with a sound box,
65 of a pair of sound conveying arms communicating therewith, the said arms being pivoted at their respective extremities to maintain the plane of the stylus substantially tangential to the grooves of the record.

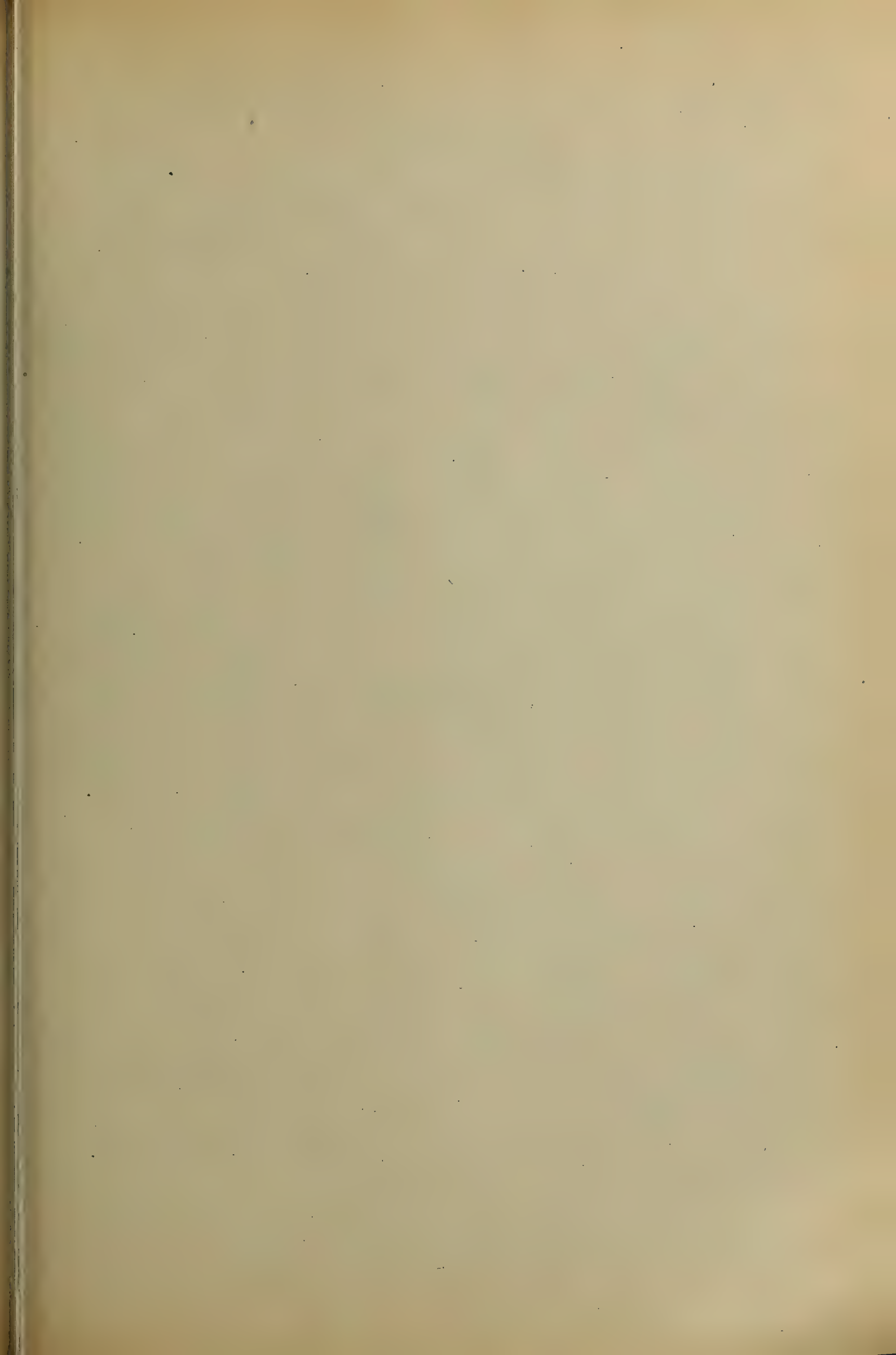
22. In a sound recording and reproducing machine, the combination with a sound box
70 and a stylus, of a plurality of sound conveying arms connected to said sound box, said sound box being mounted to move in a plane parallel to the face of the record, and means for locking the sound box to one of said
75 arms and at the same time positioning the stylus at the proper angle to the record.

In testimony whereof, I have signed my name to the specification in the presence of two subscribing witnesses.

JOHN C. ENGLISH.

Witnesses:

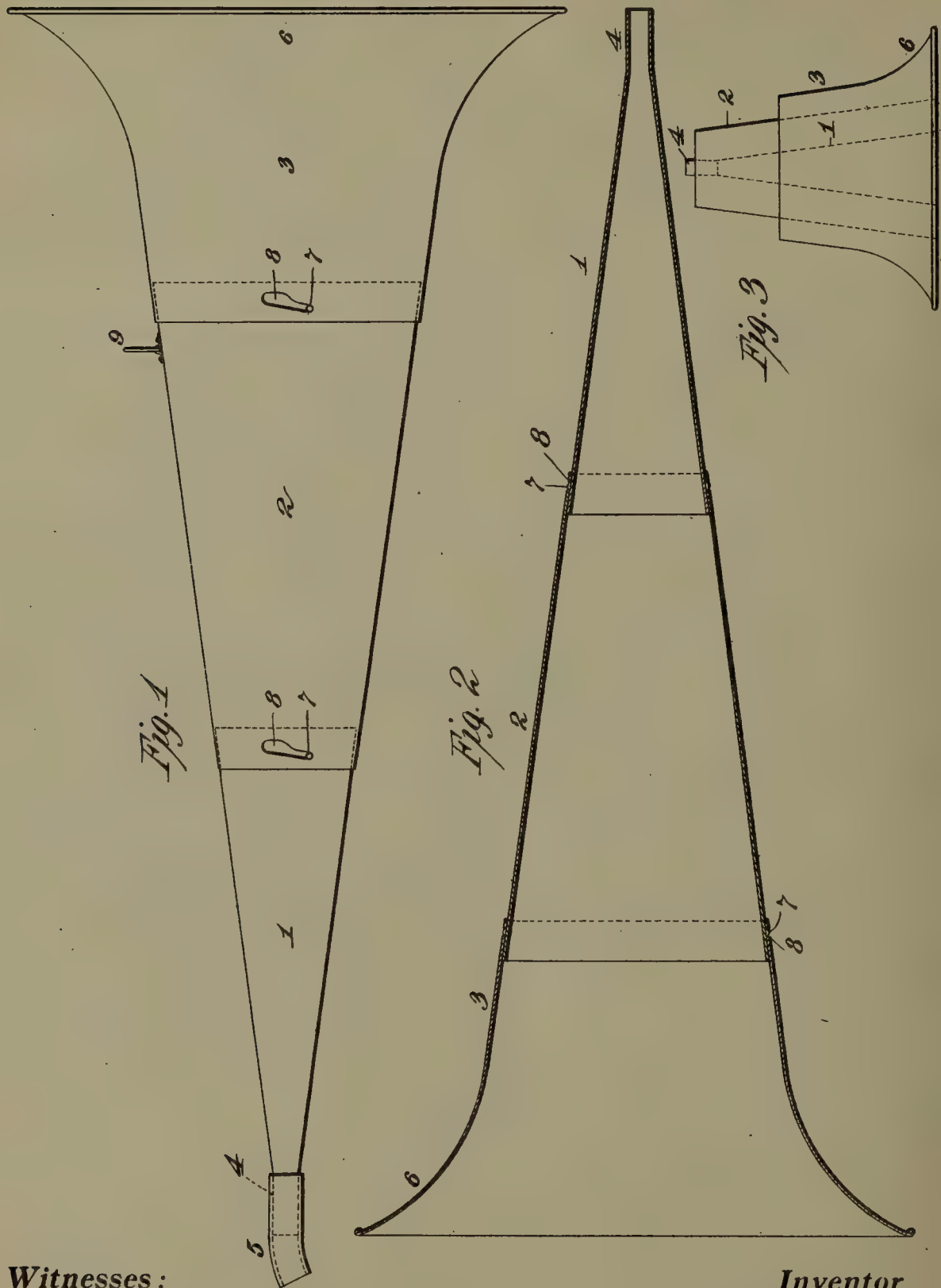
ALSTON B. MOULTON,
ALEXANDER PARK.



No. 878,029.

PATENTED FEB. 4, 1908.

P. WEBER.
PHONOGRAPH HORN.
APPLICATION FILED JUNE 29, 1904.



Witnesses:

Geo. F. Coleman
Anna P. Kehm

Inventor
Peter Weber

by Frank L. Hyer
Attorney

UNITED STATES PATENT OFFICE.

PETER WEBER, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH-HORN.

No. 878,029.

Specification of Letters Patent.

Patented Feb. 4, 1908.

Application filed June 29, 1904. Serial No. 214,595.

To all whom it may concern:

Be it known that I, PETER WEBER, residing at 571 Park avenue, East Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Phonograph-Horns, of which the following is a description.

In phonographic reproduction, superior results are secured with horns of considerable length and diameter, which at the present time, are about 30 inches long. These horns are made of sheet metal and great care has to be taken in transporting them, in order that they may not become dented or injured. Consequently, in the shipment of a phonograph outfit, a larger box is required for the horn than for the phonograph itself, and this is a serious practical objection. These horns are also bulky in the hands of the user, and objectionable for this reason.

The object of my invention is to provide a collapsible or sectional horn, having substantially as good acoustical properties as a continuous horn and which is as rigid as such a horn, but which, owing to its collapsible or sectional character, is very much less bulky than a continuous horn, whereby the objections indicated will be overcome.

In order that the invention may be better understood, attention is directed to the accompanying drawing, forming a part of this specification, in which

Figure 1 is a side elevation of one form of horn embodying my invention, showing the same made in three sections, Fig. 2 a longitudinal sectional view of the same, and Fig. 3 a side elevation, showing the parts collapsed or folded.

In these views, corresponding parts are represented by the same reference numerals.

Although I show a horn made of three sections, 1, 2, and 3, it will be obvious that it may be made of a greater or lesser number of sections. The section 1 is provided with a cylindrical neck 4 receiving the usual rubber tube 5, connecting with a nipple of the phonograph reproducer, and the section 3 is formed with the bell or flared portion 6, in the usual way. Otherwise, the sections are formed on substantially the same taper as shown, in order that they may be nested together. When extended, the sections are locked rigidly together by a joint somewhat similar to a bayonet joint, but differing from

the usual form in that one of the cooperating parts is inclined with respect to a plane perpendicular to the axis of the section as illustrated. In forming this joint, the sections 1 and 2 are provided with pins or projections 7 and the sections 2 and 3 are formed with slots 8, with which the pins engage, said slots being wider at their upper ends and curving downwardly, as shown. Ordinarily, three of these locks are formed between the adjacent sections, but obviously four or more may be used. By engaging the pins 7 with the enlarged portions of the slots 8, and by then turning the sections relatively to each other, each pin will be caused to ride down in the slots, thereby moving the sections longitudinally, and since the engaging surfaces of the sections are tapering, this longitudinal movement jams them tightly together. I find in practice, that the sections may, in fact, be thus locked together to form a structure which is longitudinally as stiff as a continuous horn, and diametrically stiffer than a continuous horn, since at certain portions of its length the metal is twice as thick as with a continuous horn. The sections may be unlocked by turning them in the opposite direction to that by which they are locked, and then disengaging the pins 7 from the slots 8. One of the sections, for instance, the section 2, may be provided with the usual ring 9, for supporting the horn from a suitable stand.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent is as follows:

1. As a new article of manufacture, a horn comprising a plurality of tapered sections provided with cooperating projections and inclined slots having enlarged portions whereby the sections may be firmly engaged with each other, the taper of the sections and inclination of the locking shoulders being such as to produce such engagement by less than one complete rotation of one section with respect to the adjacent section, substantially as set forth.

2. In a device of the character described, a tapering section having an inclined locking shoulder and a second tapered section having a projection adapted to press against said inclined shoulder, the taper of the sections and inclination of the locking shoulder being such that the overlap of the two sections is re-

duced by the locking movement, substantially as set forth.

3. As a new article of manufacture, a phonograph horn, made of sections secured together by joints, consisting of projections engaging inclined slots having enlarged portions, substantially as set forth.

This specification signed and witnessed this 28th day of June 1904.

PETER WEBER.

Witnesses:

HARRY G. WALTERS,
MINA C. MACARTHUR.

E. L. AIKEN.
PHONOGRAPH.

APPLICATION FILED AUG. 3, 1905.

Fig. 1.

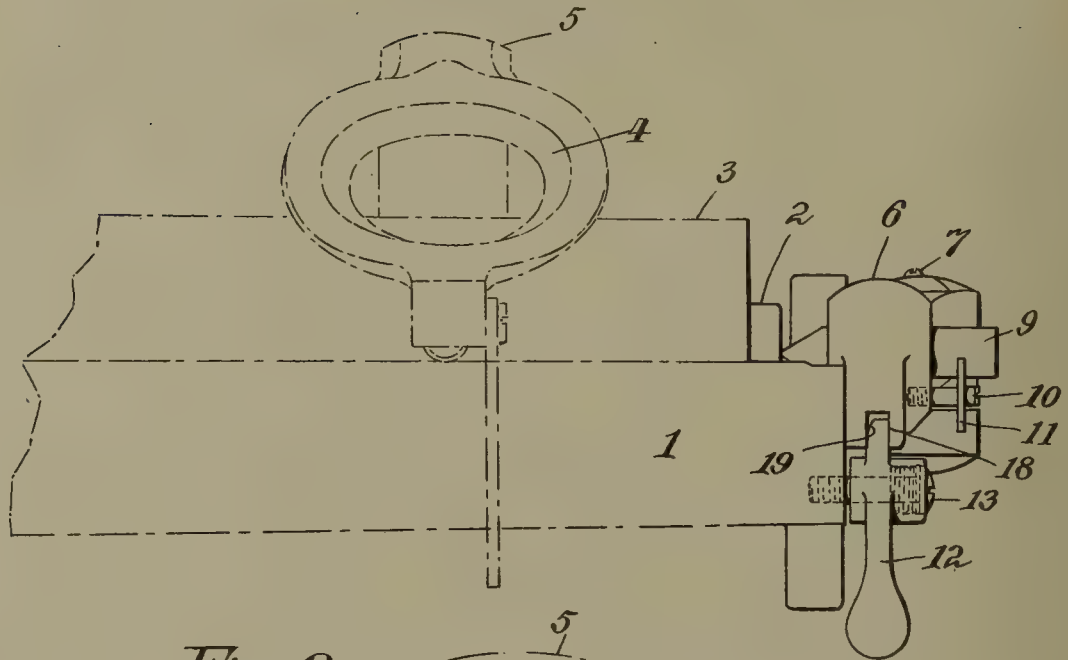
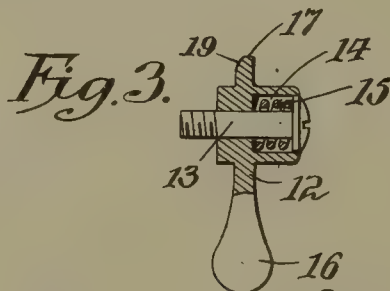
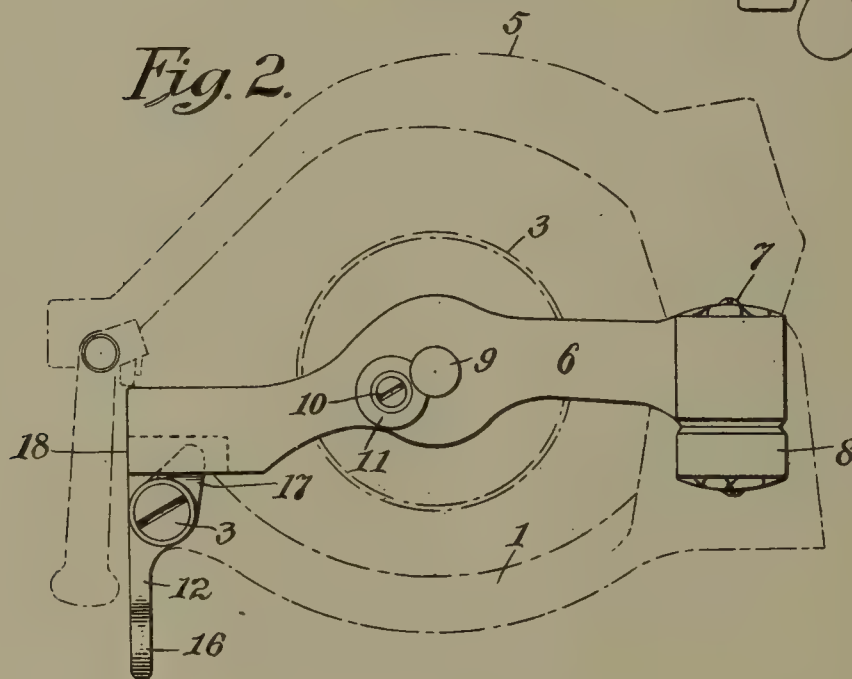


Fig. 2.



Attest:

Delos Holden

Ming C. Mac Arthur

Inventor:

Edward L. Aiken

by *Frank L. Hopen* his Att'y.

UNITED STATES PATENT OFFICE.

EDWARD L. AIKEN, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

No. 878,032.

Specification of Letters Patent.

Patented Feb. 4, 1908.

Application filed August 3, 1905. Serial No. 272,462.

To all whom it may concern:

Be it known that I, EDWARD L. AIKEN, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs and more particularly to that type known as the Edison phonograph, wherein the sound record is carried on a tapering mandrel the outer end of which is supported during the operation of the instrument by a bearing, such as a pivot pin, carried by an end gate which is pivoted at one end so that when desired it may be turned on its pivot and expose the end of the mandrel so that the sound record may be applied to or removed therefrom.

My invention has for its object the provision of an improved form of locking latch for holding the end gate in its closed position and consists in the features hereinafter set forth and claimed.

Reference is hereby made to the accompanying drawings in which

Figure 1 is a front elevation showing my invention applied to a phonograph. Fig. 2 is an end elevation of the same, and Fig. 3 is a detail view partly in section of the locking latch.

The phonograph shown is of the usual type comprising a frame or body 1 which supports a rotating tapering mandrel 2 upon which a cylindrical sound record 3 may be carried, the reproducer (not shown) being carried in an eye 4 of a traveling carries arm 5, which is supported and driven in the usual manner. The end gate 6 is pivoted on a vertical pin 7 carried by the boss 8 projecting from the frame 1, so that it can be turned from the position shown in Fig. 1 through an arc of 90 degrees or more to completely expose the end of the mandrel 2 and permit the record 3 to be withdrawn therefrom. The end gate 6 is provided with a pivot pin 9 passing there-through, and held in place by a screw 10 having a collar 11 engaging a slot in the pin 9. The pin 9 is so placed as to engage the center of the head of the mandrel to form a pivot bearing therefor. All the parts which I have thus far described are of well known construction.

In order to hold the end gate firmly in its closed position, and at the same time to readily release the same whenever desired, I pro-

vide a locking latch 12 which turns freely about a screw 13 which is threaded into the frame 1, the axis of the screw being parallel to the axis of the mandrel. Within the body of the latch 12 is formed a cup 14 which surrounds the screw 13 and contains a coil spring 15 whose ends abut against the bottom of the cup and the head of the screw 13. One end of the latch 12 is enlarged into a finger piece 16 and the opposite end into a short arm 17 for engaging the end gate.

The end gate is provided with a recess 18 into which the arm 17 passes when the finger piece 12 is moved downward. When the finger piece is moved upward, the arm 17 passes out of engagement with the end gate and permits the same to be opened. The inner wall 19 of the arm 17 is formed with an inclined, rounded or cam surface as shown in Figs. 1 and 3, whereby as the arm 17 is brought into the position shown in Fig. 2, the latch 12 is forced outward on its pivot, thereby placing the spring 14 under compression and holding the end gate 6 against the frame of the instrument with a pressure due to the strength of the spring 15 and preventing any possible play of the end gate on its pivot. Obviously the cam surface may, if desired, be placed upon the end gate instead of the arm 17.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. In a phonograph, the combination with the frame or body, rotating mandrel and pivoted end gate carrying a bearing for the outer end of the mandrel and provided with a recess, of a locking latch, a pin carried by the frame upon which said latch is pivoted on an axis substantially parallel to the axis of the mandrel, a spring coöperating with said pin to press against said latch, and a projection extending from said latch in position to engage the recess of said end gate and hold it in its closed position, one of said engaging parts being provided with a sloping cam surface for causing the latch to compress the spring and thereby hold the end gate in position under pressure, substantially as set forth.

2. In a phonograph, the combination with the frame or body, rotating mandrel and pivoted end gate carrying a bearing for the outer end of the mandrel and provided with a recess in its lower surface, of a pin carried

by said body and substantially parallel to the axis of the mandrel, a locking latch pivoted on said pin, a spring coöperating with said pin to press against said latch, said
5 latch having an upwardly extending projection adapted to engage the recess in the end gate so as to hold it in its closed position, and in a downwardly extending finger piece

for operating said latch, substantially as set forth.

10

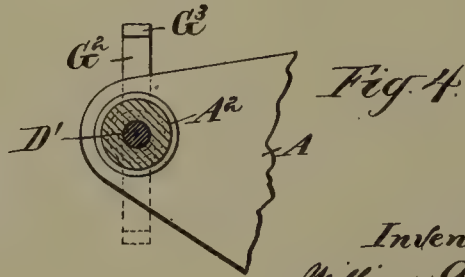
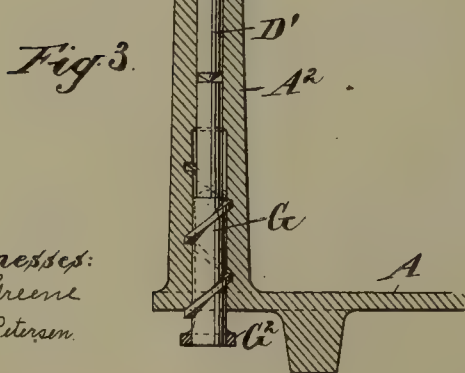
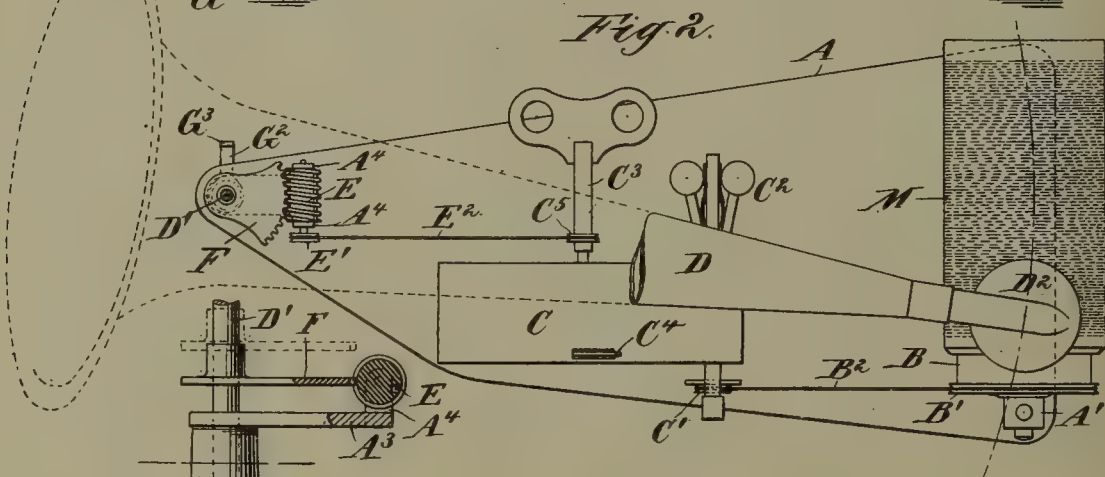
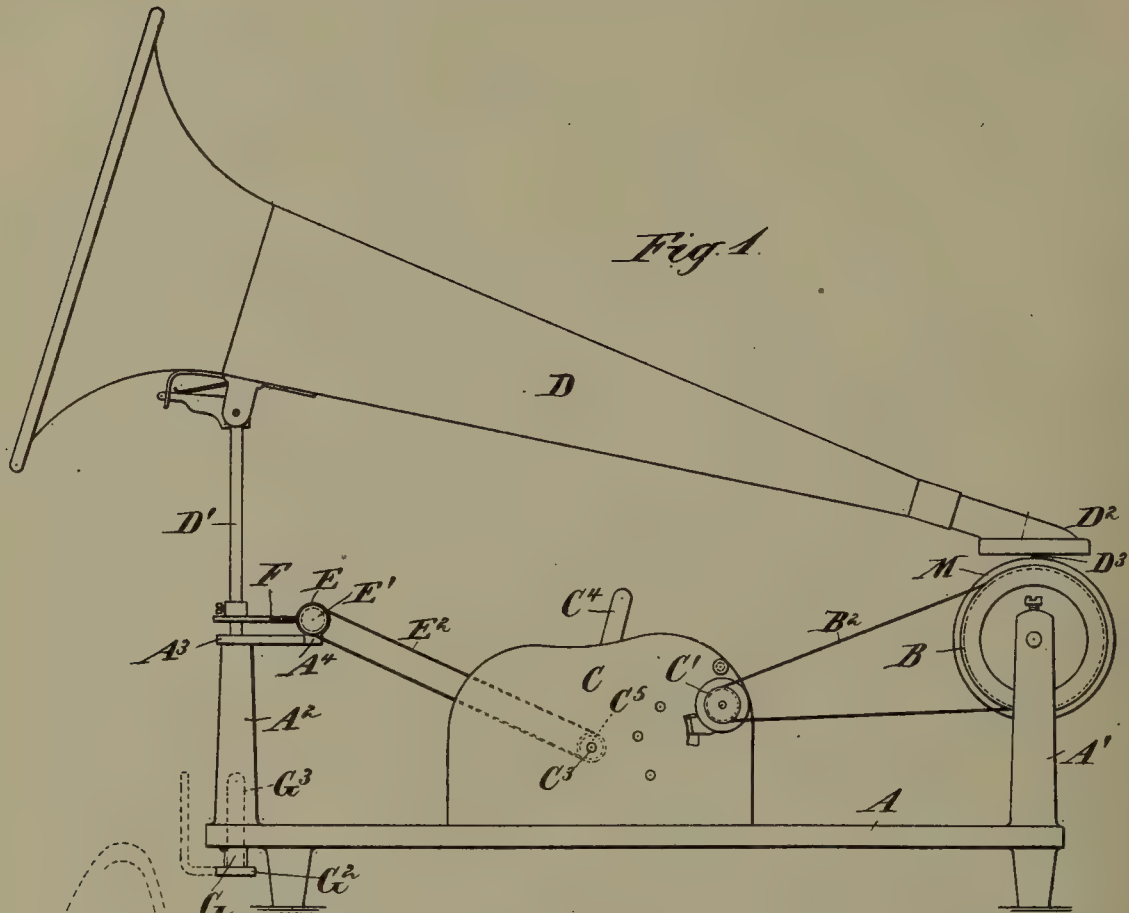
This specification signed and witnessed this 1st day of August, 1905.

EDWARD L. AIKEN.

Witnesses:

DELOS HOLDEN,
FRANK L. DYER.

W. A. COOK.
FEED MECHANISM FOR PHONOGRAPHS.
APPLICATION FILED JUNE 3, 1907.



Witnesses:
J. J. Greene
J. J. Peterson.

Inventor:
William A. Cook,
by his attorney,
Charles R. Searle

UNITED STATES PATENT OFFICE.

WILLIAM A. COOK, OF NEW YORK, N. Y.

FEED MECHANISM FOR PHONOGRAPHS.

No. 878,121.

Specification of Letters Patent.

Patented Feb. 4, 1908.

Application filed June 3, 1907. Serial No. 376,913.

To all whom it may concern:

Be it known that I, WILLIAM A. COOK, a citizen of the United States, residing in the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Feed Mechanism for Phonographs, of which the following is a specification.

The invention relates to means for moving the reproducer in unison with the spiral groove on the record so that the reproducer-point shall be maintained in proper relation thereto.

In some forms of machines for reproducing sounds the reproducer-point or sapphire is guided only by its engagement in the shallow groove in the record, and slight vibrations of the instrument, especially unless it be carefully leveled, cause the sapphire to leave its place in the groove and thus impair the rendition of the record. In other machines expensive and complex mechanism is employed to avoid this difficulty.

The object of the present invention is to provide simple, inexpensive feeding means for insuring the engagement of the sapphire or point with the record-groove, and for easily and quickly releasing such feed mechanism for a re-traverse, by the reproducer, of the same or another record.

The invention consists in certain novel features and details of construction by which the above objects are attained, to be hereinafter described.

The accompanying drawings form a part of this specification and show the invention as applied to a simple form of phonograph.

Figure 1 is a side elevation of such an instrument equipped with my improvement. Fig. 2 is a corresponding plan view, partly in horizontal section. Fig. 3 is a vertical section, partly in elevation, showing a portion of the feed mechanism and releasing means on a larger scale. Fig. 4 is a corresponding horizontal section and plan view.

Similar letters of reference indicate the same parts in all the figures.

In the form of sound-reproducing machine illustrated, A is the base of the instrument, A¹ a post thereon at one end of which is mounted the record-mandrel B provided with a pulley B¹ by which it is rotated through a belt B² from the pulley C¹ on a projecting shaft from a spring motor, only partially

shown, inclosed in the casing C and having a speed-governor C², winding-shaft C³ and controlling lever C⁴. The motor and its equipments may be of any ordinary or approved type. At the other end of the base is a horn-pipe post A² receiving a standard or pintle D¹ at the upper end of which is attached the horn D carrying the reproducer D² on which is the sapphire D³ adapted to track in the spiral groove on a cylindrical record M carried on the mandrel B. On the upper end of the horn-post is a bracket A³ having lugs A⁴ in which is journaled a worm E having a pulley E¹ by which the worm is rotated through the medium of a belt E² running on a pulley C⁵ on the winding-shaft C³ of the motor. The worm meshes with a segmental worm-wheel F on the pintle D¹ to which the horn is secured and causes the latter to swing slowly.

The pintle D¹ is received and guided in a closely fitting hole drilled vertically in the horn-post, and its conical lower end is supported on a step formed by the plane upper end of a screw G of quick pitch entering the horn-post from below and having a laterally extending lever G² on which is an upturned arm G³ by which the screw G may be partially rotated in the horn-post and, by reason of its quick pitch, caused to rise therein and lift the pintle D¹ and its attachment sufficiently to release the worm-wheel F from the worm E. Thus conditioned the horn is free and may be swung unobstructedly in either direction.

In using the machine the screw G is turned as above described to free the horn and permit the sapphire to be located at the beginning of the record-groove, the screw is then reversed and the worm-wheel lowered into mesh with the worm. The motor is then started and through the pulley C⁵, belt E², and pulley E¹ imparts a slow rotating movement to the worm, and through the segmental worm-wheel, slowly swings the horn and its reproducer in the direction and at a rate to follow the spiral groove on the record. At the termination of the groove the horn is lifted as before and returned to the starting position.

By carefully proportioning the diameters of the pulleys C⁵, E¹, pitch of the worm E, and radius of the segment F, relatively to the record-rotating pulleys B¹ C¹, the slow travel of the reproducer is made to coincide with the

advance of the record-groove and the sapphire maintained in the latter under all conditions.

The pulley C⁵ is described as mounted on the winding-shaft of the motor but it will be understood that it may be located on any conveniently disposed shaft thereof, and that motion may be communicated to the worm by other means than the belt and pulleys shown, depending upon the character and location of the motor relatively to the other parts of the instrument.

Other forms of disengaging mechanism may be substituted for the screw G, and the worm and segment varied as required in adapting the invention for service with other forms of sound-reproducing machines.

I claim:—

1. In a machine of the character set forth, a reproducer adapted to serve with a record, a pintle on which said reproducer is mounted, a worm-wheel on said pintle, a worm meshing with said worm-wheel, and means for rotating said worm.

2. In a machine of the character set forth, a reproducer adapted to serve with a record, a pintle on which said reproducer is mounted, a worm-wheel on said pintle, a worm meshing with said worm-wheel, means for rotating said worm, and means for freeing said pintle from engagement with said worm.

3. In a machine of the character set forth, a reproducer adapted to serve with a record, a pintle on which said reproducer is mounted, a worm-wheel on said pintle, a worm meshing with said worm-wheel, means for rotating said worm, and means for moving said worm-wheel and worm out of mesh with each other.

4. In a machine of the character set forth, a reproducer adapted to serve with a record, a pintle on which said reproducer is mounted, a worm-wheel on said pintle, a worm meshing with said worm-wheel, means for rotating said worm, and means for moving said pintle axially to engage said worm-wheel and worm.

5. In a machine of the character set forth, a reproducer adapted to serve with a record, a pintle on which said reproducer is mounted, a post in which said pintle is received, a

worm-wheel on said pintle, a worm meshing with said worm-wheel, means for rotating said worm, a screw in said post set axially to said pintle and serving as a step therefor, and means for turning said screw to lower or raise said pintle and thereby engage or disengage said worm-wheel and worm.

6. In a machine of the character set forth, a motor, a record-carrying means rotated by said motor, a post, a pintle received therein, a horn mounted on said pintle, a reproducer carried by said horn, a worm-wheel on said pintle, a worm in mesh with said worm-wheel, and connections from said motor to said worm for rotating the latter.

7. In a machine of the character set forth, a motor, a record-carrying means rotated by said motor, a post, a pintle received therein, a horn mounted on said pintle, a reproducer carried by said horn, a worm-wheel on said pintle, a worm in mesh with said worm-wheel, connections from said motor to said worm for rotating the latter, and means for lowering and raising said pintle to engage and disengage said worm-wheel and worm.

8. In a machine of the character set forth, a motor, a record-carrying means rotated by said motor, a post, a pintle received therein, a bracket fixed on said post, a horn mounted on said pintle, a reproducer carried by said horn, a worm-wheel on said pintle, a worm rotatably mounted in said bracket and adapted to mesh with said worm-wheel, a pulley on said worm, a pulley on a shaft of said motor, a belt running on said pulleys and serving to rotate said worm, a screw in said post set axially to said pintle and serving as a step therefor, and means for turning said screw to lower or raise said pintle and thereby engage or disengage said worm-wheel and worm.

In testimony that I claim the invention above set forth I affix my signature, in presence of two witnesses.

WILLIAM A. COOK.

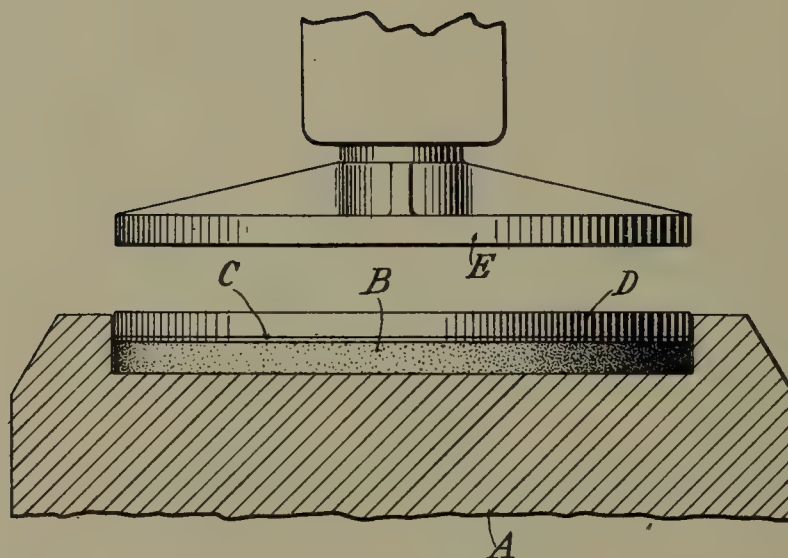
Witnesses:

CHARLES R. SEARLE,
R. P. SCHULZE.

No. 878,513.

PATENTED FEB. 11, 1908.

V. H. EMERSON.
YIELDING MATRIX FOR SOUND RECORDS.
APPLICATION FILED JUNE 29, 1906.



Witnesses
Raphael Ketter
R. L. Scott

Victor H. Emerson,
Inventor

By his Attorneys:
Mauro, Cameron, Lewis & Macchi

UNITED STATES PATENT OFFICE.

VICTOR H. EMERSON, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

YIELDING MATRIX FOR SOUND-RECORDS.

No. 878,513.

Specification of Letters Patent.

Patented Feb. 11, 1908.

Application filed June 29, 1905. Serial No. 267,590.

To all whom it may concern:

Be it known that I, VICTOR H. EMERSON, a citizen of the United States, and a resident of New York city, New York, have invented
5 a new and useful Improvement in Yielding Matrices for Sound-Records, which improvement is fully set forth in the following specification.

This invention relates to the production of
10 sound-records by the impressing of a suitable matrix into a disk or tablet of suitable material. Such matrices are electroplates, formed upon a wax-like original sound-record by the ordinary process of electrolysis.
15 These electroplates are comparatively thin sheets of metal which are backed up by heavy plates to which they are soldered or otherwise permanently secured. The surface of such matrix is seldom or never a true
20 geometric plane, so that if a composite tablet is to be impressed (to produce the sound-record) some provision must be made to compensate for this want of geometric trueness. My present invention not only provides this
25 compensation, but also saves the time and expense of providing the heavy backing for the matrix, and incidentally permits a number of matrices to be stored in a small space.

My invention consists briefly in providing
30 a yielding substance between the matrix and the platen, or the plunger, of the press, so as to produce a yielding matrix which will press with uniform pressure upon every portion of the surface of the record or disk to
35 which it is applied.

In the drawings annexed hereto to illustrate an embodiment of my invention, Figure 1 is a conventional representation of a press containing the invention.

40 In the press A is shown a recess containing a sheet of a body B, which is a sheet of soft rubber, felt, cloth, or any yielding substance. Upon this body B rests the electroplate matrix C (a thin sheet of electro-deposited
45 metal).

D represents the record-tablet, which is to be impressed against the matrix by the plunger E of the press. Of course, the plunger or movable part of the press might be the lower member, or both members might be
50 made to approach and recede from each other; and, in like manner, the record-tablet may lie at the bottom with the matrix on top of that, and the yielding body B upon top of that; and also the yielding body may
55 be interposed between the tablet B and the press, but the best results are obtainable by the construction shown.

Other changes and modifications may be employed, but the spirit of my invention lies
60 in employing in connection with the thin electroplate or matrix a yielding body between the back of said matrix and the press, so as to dispense with the heavy backing heretofore made integral with the matrix,
65 and to compensate for any departure from absolute trueness of either the matrix surface or the record-tablet surface.

Having thus described my invention, I
claim:

1. The combination with a press having two relatively-movable members of a flexible electro-deposited matrix of a sound-record, a yielding body at the back of said matrix between the same and one member of the press,
75 and a tablet of comparatively rigid material for making a pressed sound-record on the other side of said matrix and between the same and the other member of said press.

2. The combination of a thin and comparatively flexible electro-deposited matrix of a sound-record and a backing of yielding material therefor.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

VICTOR H. EMERSON.

Witnesses:

C. A. L. MASSIE,
R. L. SCOTT.

I. G. FOSLER.
TALKING MACHINE.
APPLICATION FILED JULY 15, 1907.

Fig. 1

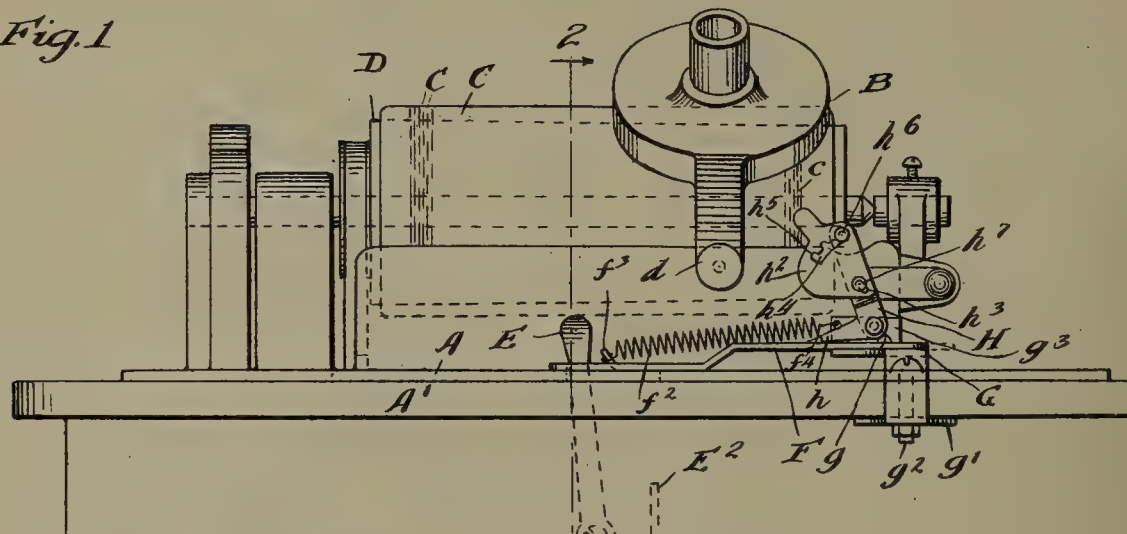


Fig. 2

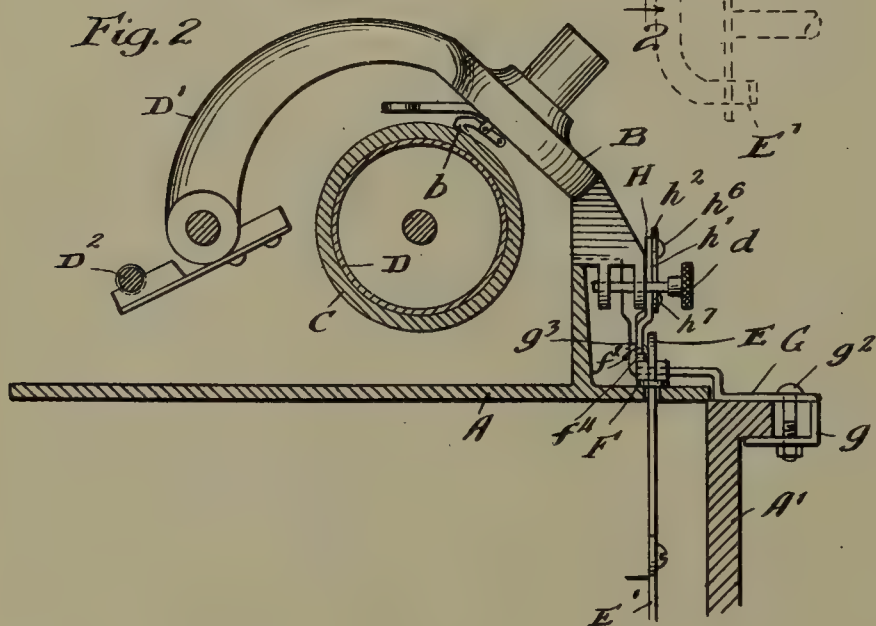


Fig. 3

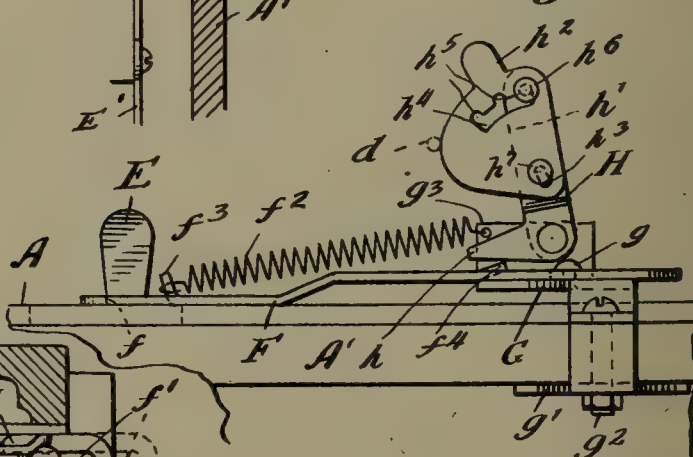
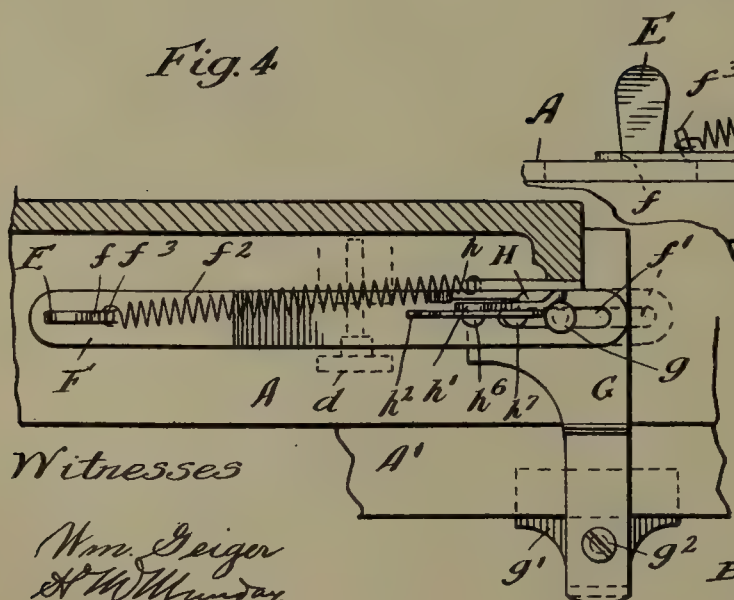


Fig. 4



Witnesses

Wm. Geiger
A. W. Munday

Inventor:
Ira G. Fosler

By Munday, Evans, Adcock & Clark.

Attorneys

UNITED STATES PATENT OFFICE.

IRA G. FOSLER, OF CHICAGO, ILLINOIS.

TALKING-MACHINE.

No. 878,516.

Specification of Letters Patent.

Patented Feb. 11, 1908.

Application filed July 15, 1907. Serial No. 383,804.

To all whom it may concern:

Be it known that I, IRA G. FOSLER, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Talking-Machines, of which the following is a specification.

My invention relates to improvements in talking-machines.

10 In the practical operation of talking-machines, considerable difficulty and annoyance has heretofore been experienced from the fact that the machine continues to run after the sound reproduction on the record
15 has been completed, the "overrunning" of the record as it is called, not only producing a disagreeable noise but also tending to wear away and injure the reproducing stylus.

20 The object of my invention is to provide a simple, efficient and durable construction of talking machine which will automatically stop when the reproducing stylus reaches the end of the sound record to be reproduced.

25 My invention consists in the novel construction of parts and devices and in the novel combinations of parts and devices herein shown and described by which this object or result is practically accomplished.

30 In the accompanying drawing forming a part of this specification, Figure 1 is a front elevation of a talking machine embodying my invention. Fig. 2 is a detail vertical section on line 2—2 of Fig. 1. Fig. 3 is a detail elevation showing the parts in a different position from that illustrated in Fig. 1.
35 Fig. 4 is a detail plan view partly in horizontal section.

40 In the drawing, A represents the frame of the machine, B the reproducer having the customary stylus *b* traveling in the sound record groove *c* of the record C, D the rotary mandrel or holder to which the record C is secured, D¹ the traveling carriage or support upon which the reproducer is mounted
45 and D² the feed-screw for the reproducer carriage.

50 E is the stopping and starting lever having the customary brake arm E¹ engaging the brake wheel E² of the governor or speed regulating device. All these parts may be of any suitable kind or construction customarily employed in phonographs, graphophones or other talking machines. For convenience in the drawing, I have illustrated the same
55 as being of a well known phonograph construction.

In order to automatically stop the machine and further rotation of the record C when the reproducer reaches the end of the sound record groove *c* thereon, I connect with the stop lever E of the talking machine an automatically movable stop device or slide F preferably having a slot *f* to receive the upper end of the stop lever E and a slot *f*¹ to receive the guide pin or projection *g* on the clamp G, by which, in connection with the clamp piece *g*¹ and clamp screw *g*², the automatic stop device is mounted upon the frame of the machine or its inclosing box A¹. The stop slide or device F is furnished with a spring *f*² engaging an integral lip *f*³ on the stop slide at one end, and an upwardly projecting flange *g*³ on the fixed clamp G at the other end. This spring, when the stop slide is released by the releasing trigger H, serves to automatically retract the stop slide and operate the stop lever E of the machine. The stop slide F is further provided with a set or projection *f*⁴ which engages the toe *h* of the releasing trigger H, which is pivoted to the upright flange *g*³ of the clamp G. The releasing trigger H is preferably not directly engaged by the traveling carriage but its upright arm *h*¹ is furnished with an adjustable arm *h*² which is so engaged by the reproducer carriage to operate the releasing trigger and release the stop slide when the reproducer carriage moves to the right to the required extent or until the reproducer stylus comes to the end of the sound record groove *c* in the record C. The releasing trigger is provided with an adjustable arm *h*² so that the automatic stop device may be set to operate at different positions of the reproducer carriage as the sound record grooves cover varying lengths of the record C according to the length of the song or piece of music that may be recorded thereon. The adjustable arm *h*² is preferably of sector shape and furnished with a pivot slot *h*³ at its lower end and a curved slot *h*⁴ at its upper end having a plurality of notches *h*⁵ therein to engage the rivet *h*⁶ in the upper arm *h*¹ of the releasing trigger. The adjustable arm is secured to the releasing trigger at its lower end by a rivet *h*⁷. By simply slipping the releasing trigger slightly upward, the upper rivet *h*⁶ will be free from the notches *h*⁵, and then the adjustable arm can be swung to either side into position for the upper rivet *h*⁶ to enter another notch *h*⁵ in the adjustable arm *h*².

In operation when the reproducer carriage

moves to the right as indicated in Fig. 1 of the drawing, to the required extent, it engages the adjustable arm h^2 of the releasing trigger and thus releases the spring actuated stop slide F and causes the same to automatically operate the stop lever E and stop the machine.

The reproducer carriage D^1 has a handle or pin d which engages the adjustable arm h^2 .

10 I claim:—

1. In a talking machine, the combination with the rotary record holder, reproducer, reproducer carriage and the stop lever, of an automatic stop slide having a setting projection, a spring for actuating said stop slide, a clamp upon which said stop slide reciprocates, a releasing trigger having an adjustable arm in the path of the reproducer carriage to automatically stop the machine and prevent overrunning of the sound record, said releasing trigger having an upright arm furnished with upper and lower rivets, and said adjustable arm having a pivot slot at its lower end and a curved slot at its upper end furnished with a plurality of adjusting notches adapted to engage said upper rivet, substantially as specified.

2. The automatic stop attachment for talking machines comprising a clamp having

a movable clamp piece and clamp screw and provided with an upturned flange, a stop slide having a slot at one end to receive the stop lever of the talking machine, and a slot at the other end for connection with said clamp, a spring connecting said stop slide and clamp, a set projection on the stop slide and a releasing trigger furnished with an adjustable arm having a pivot slot and a curved slot furnished with a plurality of adjusting notches, substantially as specified.

3. The automatic stop attachment for talking machines comprising a clamp, a stop slide mounted thereon, and having a set projection for engagement with the releasing trigger and a slot to receive the stop lever of the talking machine, a spring connecting said stop slide and clamp and a releasing trigger mounted pivotally upon said clamp, said releasing trigger having an adjustable arm furnished with a pivot slot at its lower end and a curved slot at its upper end provided with a plurality of adjusting notches, substantially as specified.

IRA G. FOSLER.

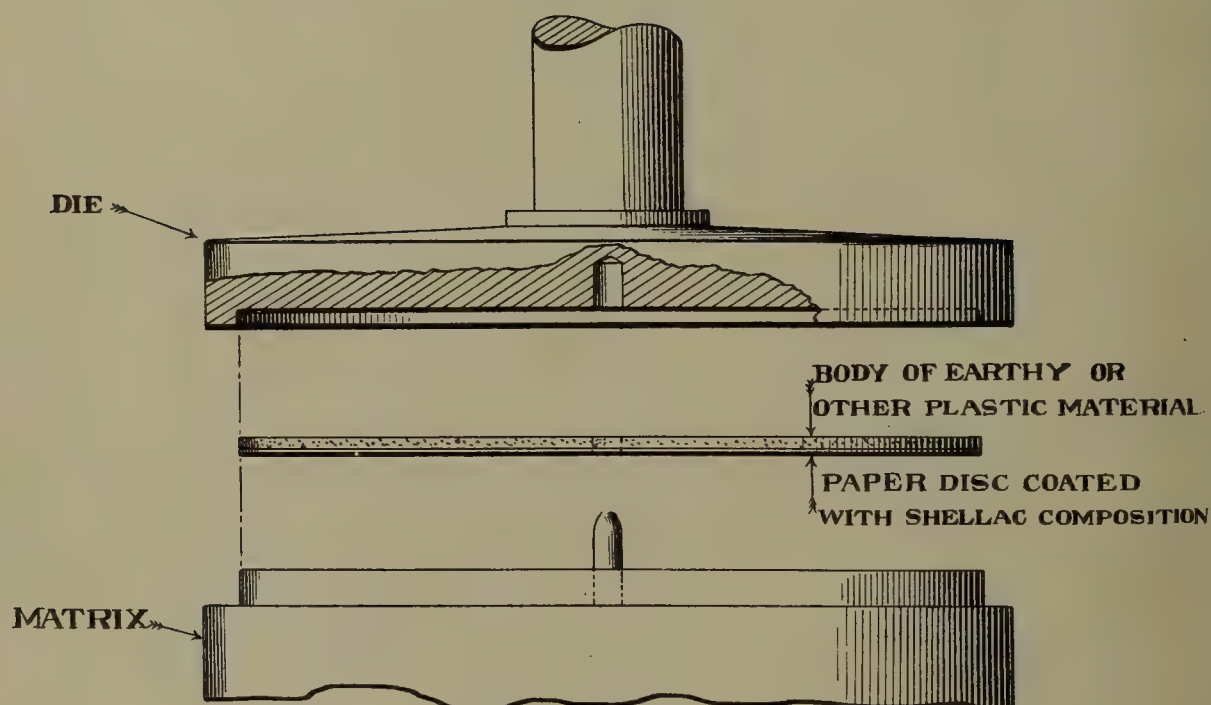
Witnesses:

H. M. MUNDAY,
EDMUND ADCOCK.

No. 878,547.

PATENTED FEB. 11, 1908.

T. H. MACDONALD.
PRODUCTION OF DISK SOUND RECORDS.
APPLICATION FILED SEPT. 8, 1906.



Inventor

Thomas H. Macdonald,

Witnesses

H. C. Thompson

Ruth C. Fitzhugh

By

Mauro, Cameron, Lewis & Massie

Attorneys

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

PRODUCTION OF DISK SOUND-RECORDS.

No. 878,547.

Specification of Letters Patent.

Patented Feb. 11, 1908.

Application filed September 8, 1906. Serial No. 333,812.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, a citizen of the United States, and a resident of Bridgeport, Connecticut, have
5 invented a new and useful Production of Disk Sound-Records, which improvement is fully set forth in the following specification.

The present invention relates more particularly to the manufacture of disk sound-records, and has for its object to cheapen the
10 production of such records, and at the same time to improve their quality, especially in respect to strength, durability, and uniformity of product.

15 Sound-records of the disk type are, and for many years have been, made of compositions of heavy earthy material compacted by means of shellac. Various earthy materials have been used, in varying proportions,
20 each manufacturer having his own formula, but shellac is an essential ingredient of all, and is that which contributes chiefly to the cost of the composition. Generally, the shellac is distributed uniformly throughout
25 the mass, its primary purpose being as a binding material. It has, however, been discovered that the essential advantage of the presence of shellac in these compositions when used for sound-records, is the glazed
30 surface imparted by that material, and for which no substitute has as yet been found. The effect of the peculiar surface due to the presence of shellac is to cause the reproducing stylus to slide easily and smoothly along
35 the record groove, thus producing good tone quality and also prolonging the life time of the record. Without shellac in proper proportion in the surface, the reproduction would be extremely harsh, and the record
40 would be destroyed after a very few reproductions. As the result of this discovery of the special function of the shellac it has been found that sound-records of the best quality can be produced by confining shellac substantially to the surface of the record tablet,
45 and employing another material as a binder in the body of the tablet. The improvement just referred to is described in the Hoyt and Gaven Patents Nos. 808,842, 808,843, and 809,263, all dated January 2, 1906. The
50 result is a tablet of practically homogeneous composition, quite indistinguishable in appearance from, and exhibiting the same fracture as, sound-records wherein shellac is
55 used uniformly throughout the tablet. By

this Hoyt and Gaven process a very large economy is effected in the manufacture of the sound-records.

In carrying out the Hoyt and Gaven process care must be taken to form a continuous
60 layer of the surfacing material over the inferior body material. Should the latter come to the surface, even for a very small area, a soft spot would result, and the sound-record would be defective. As a precaution against
65 such possibility, and against lack of care on the part of the workman, the surface layer is made of greater thickness than is necessary relative to the depth of the record-groove.

In carrying out the present invention, 70 paper (preferably hard paper) is cut into disks of proper size, and I may then proceed either to coat the paper with shellac solution and dust it with shellac powder, or I may
75 take the dry paper and dust it with the dry shellac powder and then apply heat. The "shellac powder" employed may be more or less pure shellac, or may consist of shellac and other ingredients and any desired coloring matter, and the term "shellac powder" 80 as hereinafter employed is intended to include both the pure shellac and shellac with other ingredients. In either case the result is an article that somewhat resembles ordinary sand-paper in appearance, the particles
85 or granules of the shellac powder adhering firmly and closely to the surface of the paper. These coated paper disks may be prepared in quantities and delivered to the workmen when needed for making records. To complete the record, the shellac-dusted paper
90 disk is placed face downward upon the heated matrix, a sufficient amount of plastic backing-material is placed on the back of the paper, and the whole is pressed in the usual
95 manner. The finished record shows no sign of the paper, which is concealed by the surfacing of the shellac powder. This shellac powder may be made of more or less pure shellac, or may contain other ingredients
100 such as celluloid, etc., and any desired coloring matter. Furthermore, I may apply a disk of paper at the back of the backing-material, so that the finished article will have one or two (if the second sheet of paper be
105 employed) sheets as a binder, which serves to reinforce and stiffen the record.

Instead of applying the backing to the shellac-dusted paper while the latter is upon the matrix and compressing the whole so as 110

to unite the backing and present the record-surface simultaneously, the shellac-dusted paper may be applied to a suitable backing, and such prepared articles kept in stock and subsequently pressed against a matrix.

Other variations may be made in the process without departing from the essence thereof; and it is apparent that the process is not necessarily limited to a composition or powder containing shellac.

The advantage of this process is, first, its great economy: The amount of powder necessary to coat the paper is only from one-half to three-quarters of an ounce, whereas the smallest amount that can be employed under the present process is about two ounces; moreover, in making such records in a factory employing hundreds of pressmen, there is inevitably considerable waste, owing to carelessness, but in carrying out my present invention the preparation of the shellac-dusted paper would be in a special room and by men trained to do just that work and nothing else. This shows a saving of at least seventy-five per cent. of shellac-powder which is an element of great expense in the making of sound-records. The second advantage is that records can be made more rapidly in this manner than in the old way. A third advantage is, as already indicated, that the sheet of paper seems to stiffen the record and renders it more durable.

In the accompanying drawing is shown part of a press for pressing disk sound-records, and also a disk of paper coated with the record-surface material, and a backing of earthy (or other suitable plastic) material, therein, illustrating the method by which disk sound-records are produced according to the present invention.

The product of the above-described process is not claimed herein, being made the subject-matter of a separate application.

Having thus described my invention, I claim:

1. The process which consists in coating sheets of paper with plastic material, and uniting two or more coated sheets to form a record tablet.

2. The process of manufacturing disk sound-records, which consists of applying shellac-powder to a disk of paper, applying the same upon a record-matrix, applying suitable backing-material upon the back of the paper, and compressing the same.

3. The process of manufacturing disk sound-records, which consists of applying shellac-powder to a disk of paper, applying the same upon a record-matrix, applying suitable backing-material upon the back of the paper, and compressing the same under heat.

4. The process of manufacturing disk sound-records, which consists of applying a shellac solution to a disk of paper, dusting the same with shellac powder, drying it, and compressing the same with a suitable backing against a record-matrix.

5. The process of manufacturing disk sound-records, which consists of applying a shellac solution to a disk of paper, dusting the same with shellac powder, drying it, and compressing the same with a suitable backing against a record-matrix in the presence of heat.

6. The process of manufacturing a disk sound-record, which consists of applying shellac powder to a paper disk, heating the same causing it to adhere, and subsequently compressing the same with a suitable backing against a record-matrix.

7. The process of manufacturing disk sound-records, which consists of preparing a shellac dusted paper, applying the same to a suitable backing, and compressing the whole against a record-matrix.

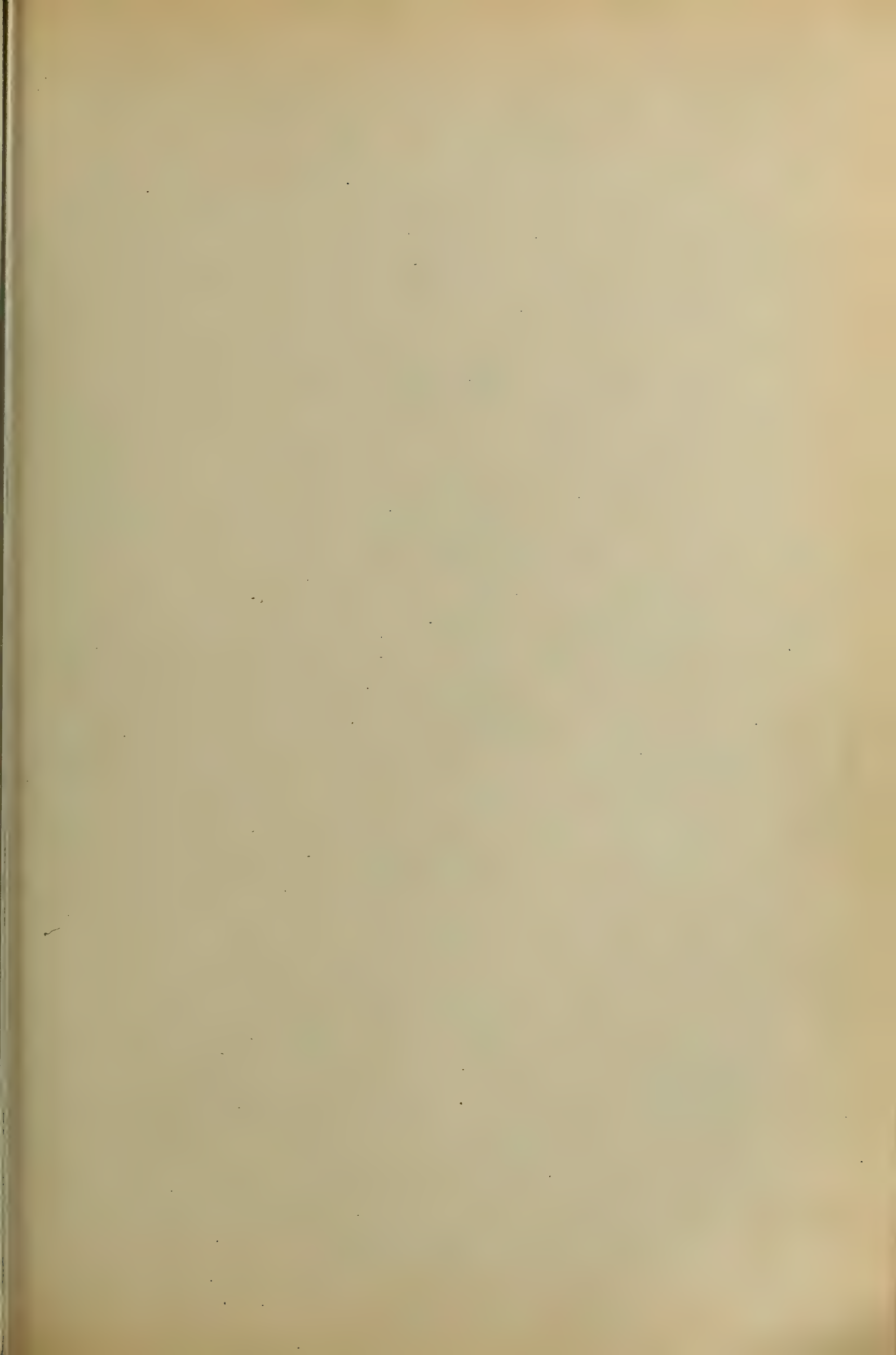
8. The process of manufacturing disk sound-records, which consists of preparing a shellac-dusted paper, applying the same to a suitable backing, and compressing the whole against a record-matrix under heat.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

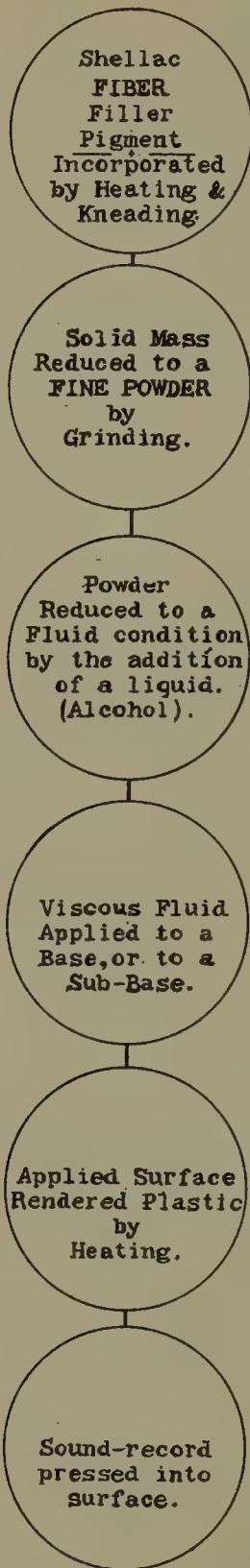
A. B. KEOUGH,
R. T. PITT.



H. S. BERLINER.

METHOD OF MAKING GRAMOPHONE RECORD TABLETS.

APPLICATION FILED NOV. 11, 1907.



Witnesses

L. E. Stettin
J. M. Meaford

Inventor

Herbert S. Berliner
By
Eugene W. Johnson -
Attorney

UNITED STATES PATENT OFFICE.

HERBERT S. BERLINER, OF WASHINGTON, DISTRICT OF COLUMBIA.

METHOD OF MAKING GRAMOPHONE-RECORD TABLETS.

No. 878,931.

Specification of Letters Patent.

Patented Feb. 11, 1908.

Application filed November 11, 1907. Serial No. 401,725.

To all whom it may concern:

Be it known that I, HERBERT S. BERLINER, a citizen of the United States of America, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Method of Making Gramophone-Record Tablets; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

15 This invention has reference to the manufacture of gramophone sound-record tablets, and has for its object to reduce the cost of production without impairing the durability or wearing qualities of the record.

20 In carrying my invention into effect, I first make a mixture of the ingredients or elements that ultimately form the surface in which the sound-grooves are impressed, and such mixture may be made up of barites, 25 silica or other earthy matter, a fiber, as cotton-flock, asbestos, shoddy or light fibrous material, with shellac, and when desired coloring matter may be added.

The above named ingredients or the 30 equivalents thereof are thoroughly incorporated or mixed together by heating and kneading, the mixture being rolled into sheets forming a solid mass when cool. This solidified base composed of granular material, a fiber, and shellac, is reduced by 35 grinding to a fine powder, and such grinding of the hard or solid mass which has a fiber intermixed therewith produces a fine powder in which the fiber is thoroughly incorporated. 40 It is important to note that, in order to grind the fiber into a powder, it must be incorporated into a hard cold mass forming a part thereof, and this is one of the particulars of my improvement over other methods which 45 enables me to subsequently produce an entirely homogeneous fibrous fluid for coating the hard base of my record.

Having reduced the fibrous mass to a fine powder, I next bring it to fluidity by the addition of alcohol, or other fluid solvent of 50 shellac, the amount of alcohol or liquid that is added being sufficient to reduce the dry powder to a viscous fluid, and such fluid is applied either to one or both sides of a solid base 55 or foundation, for instance, a disk of pasteboard, wood, metal or resinous composition,

or to a sub-base, as a sheet of paper, which may then be reinforced by a backing, and when one coat or covering has been applied and has dried a second coat may be applied, 60 and so on until a surface of the desired thickness is secured. The coat or coatings may be applied by a brush or roller, and when the solvent has evaporated, the mixture solidifies and forms a hard coating. Before im- 65 pressing the sound-record into the surface of the tablet or disk it is heated to render the sound-record surface plastic, after which the sound-grooves are impressed therein in the usual manner, the disk being cooled while 70 under pressure and while in close contact with the sound-record matrix.

I desire to cover in this application the method described for producing an entirely homogeneous fibrous fluid for making a 75 gramophone record surface, and I do not broadly claim herein the general idea of coating a disk with a gramophone record composition in fluid form, drying the latter and impressing a record therein. 80

The method or process is illustrated by the accompanying diagram.

I claim:

1. The method of making gramophone sound-records, consisting in kneading the 85 materials which are to form the record surface, one of the materials being a fiber, the mixture being effected in the presence of heat, grinding the resulting mixture when cooled into a fine powder, mixing the powder 90 with a proper liquid for changing the same into a viscous fluid, applying one or more coats of such fluid to one or both sides of a disk, drying the surface, and impressing a sound-record into said surface-coated-disk 95 under heat and pressure.

2. The herein described method of making sound-record tablet surfaces for gramophones, which consists in kneading under heat the materials, including a fiber, which 100 ultimately form the record-surface, grinding the resultant mass after cooling to a fine powder, reducing the powder to a viscous fluid by mixing the same with a liquid, applying one or more coats of said fluid to a 105 base or sub-base, to form when dried and subsequently softened by heat a surface in which the sound-grooves are impressed.

3. The herein described method of making a sound-record surface for gramophone tablets consisting in incorporating by heating 110 and kneading an earthy base, shellac, and

fiber, to form when cool a solid mass, reducing such mass by grinding to a fine powder, mixing the powder with alcohol to form a viscous fluid, covering a base or sub-base
5 with the mixture and when dry softening the applied mixture by heat preparatory to impressing the sound-grooves therein.

10 4. The method for making a surface for sound-record tablets, which consists in incorporating by kneading under heat an earthy granular base, fiber and shellac, with or without a pigment, cooling the same to form a solid mass, grinding the mass to a fine

powder, mixing such powder with a fluid to reduce the same to fluidity, applying such
15 mixture to a suitable base or sub-base to form when dried and subsequently softened by heat a surface in which the sound-grooves are impressed.

In testimony whereof I affix my signature
20 in presence of two witnesses.

HERBERT S. BERLINER.

Witnesses:

DAVID ROTHSCHILD,
JOSEPHINE AMES.

W. C. MAYO & J. HOULEHAN.

ANNUNCIATOR.

APPLICATION FILED MAY 22, 1907.

4 SHEETS—SHEET 1.

Fig. 1.

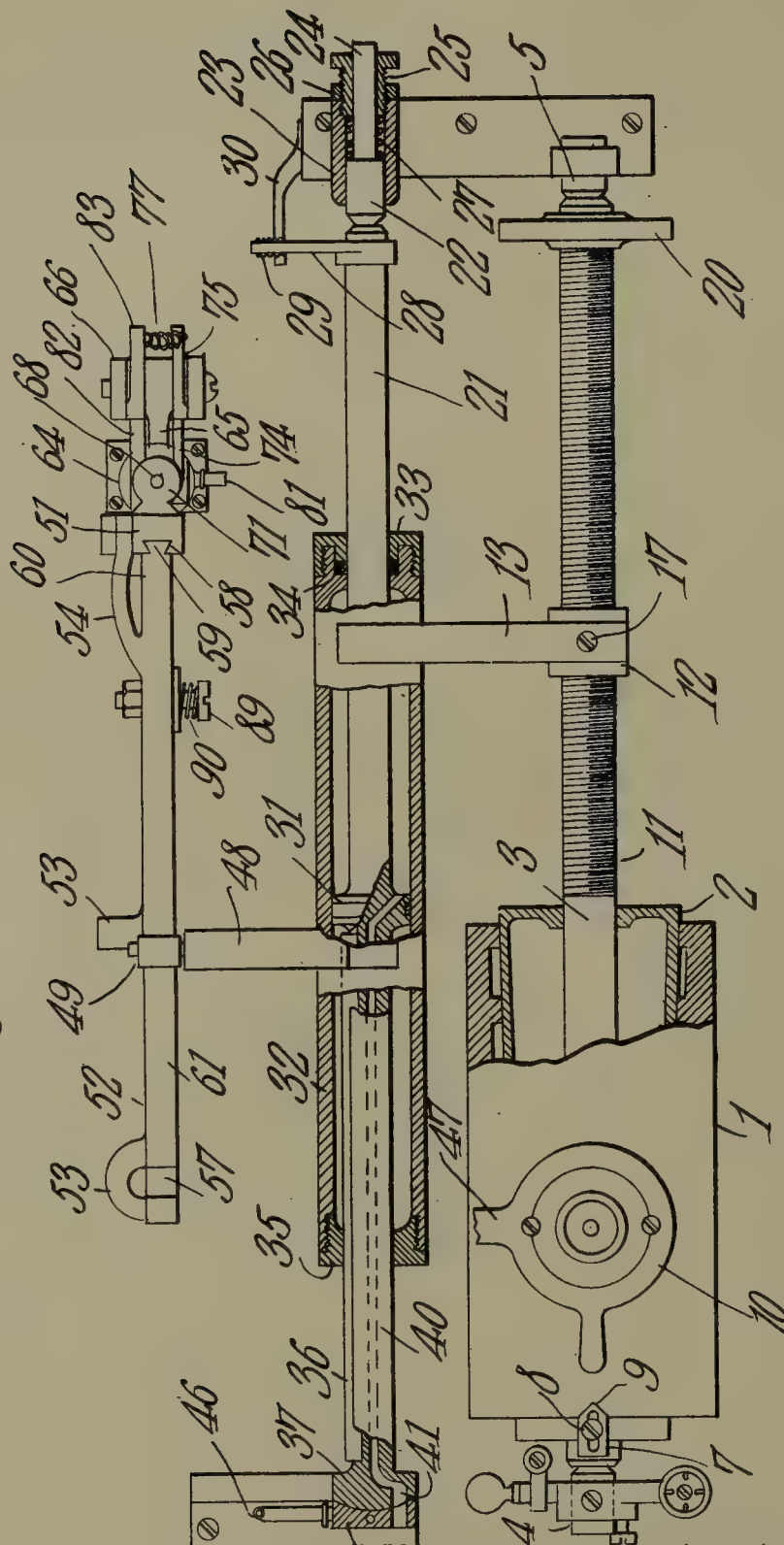
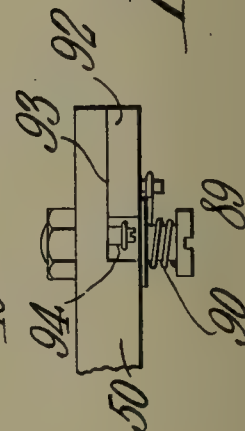


Fig. 11.



WITNESSES:

E. J. Chapman
J. J. Chapman

William C. Mayo INVENTOR
John Houlehan

By *C. A. Snow & Co.*
ATTORNEYS

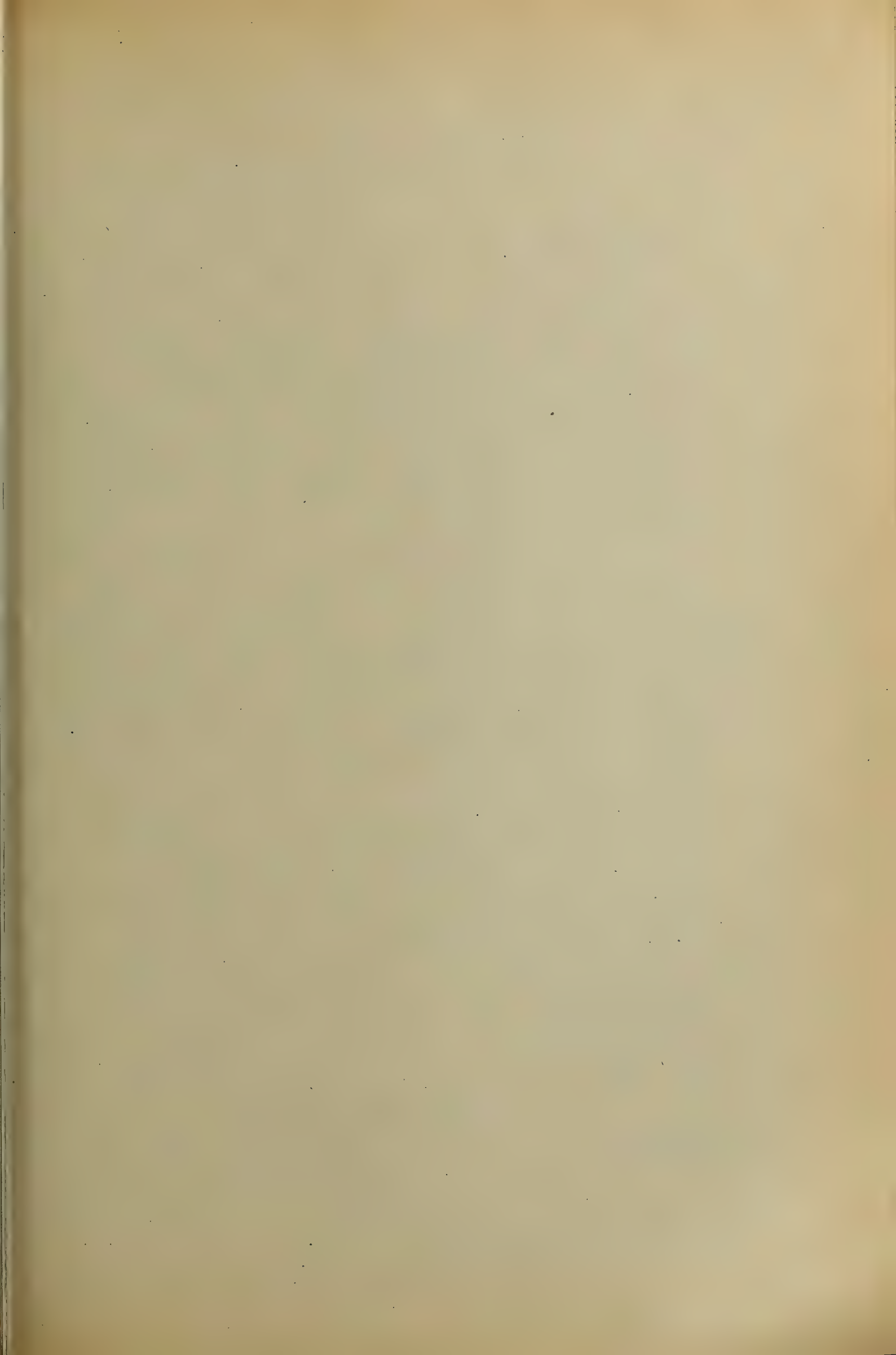


Fig. 2.

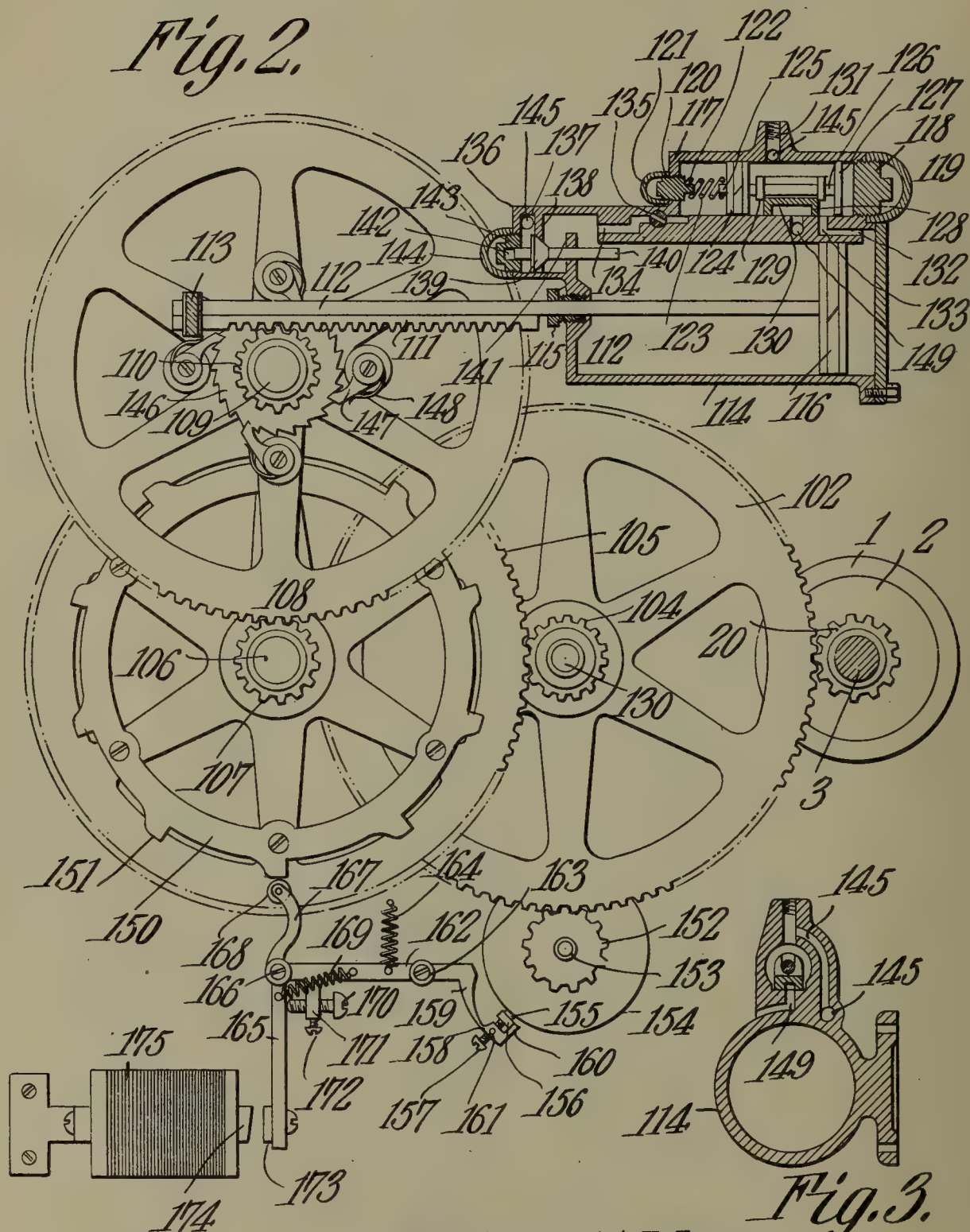


Fig. 3.

WITNESSES:

E. H. Hunt
F. J. Chapman

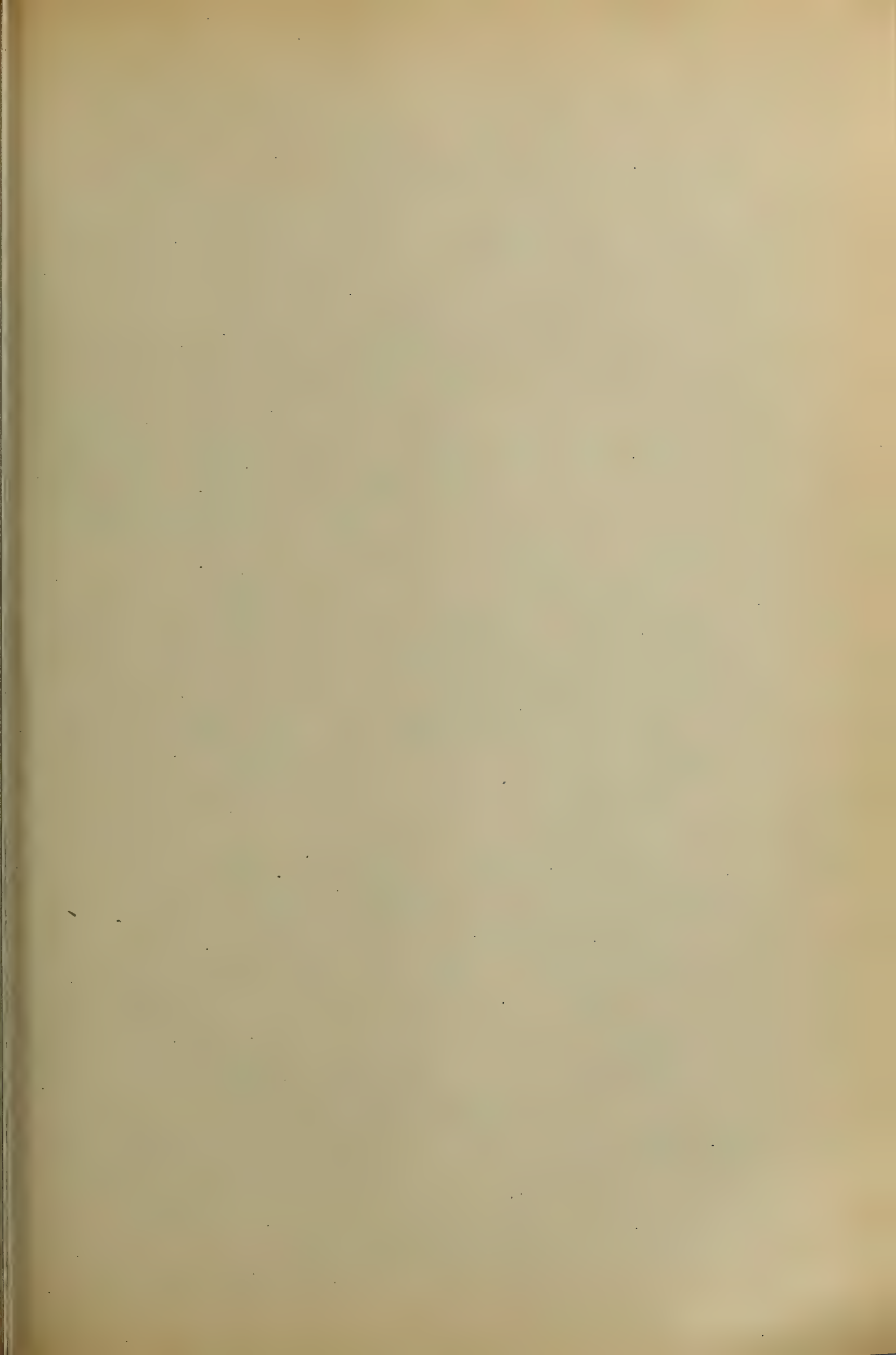
William C. Mayo
John Houlehan

INVENTORS.

By

C. A. Snow & Co.

ATTORNEYS

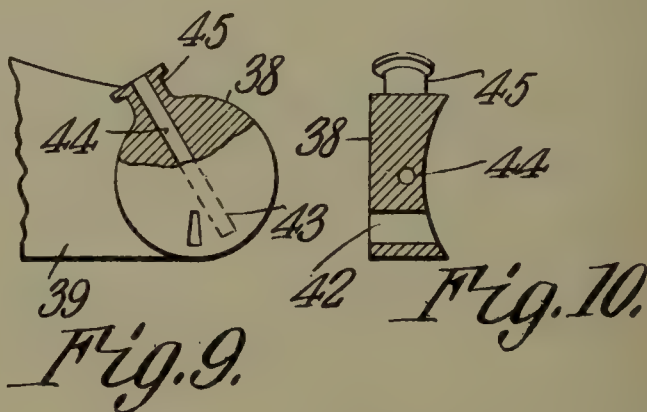
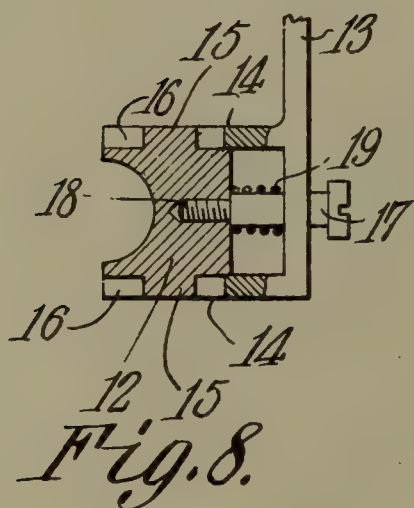
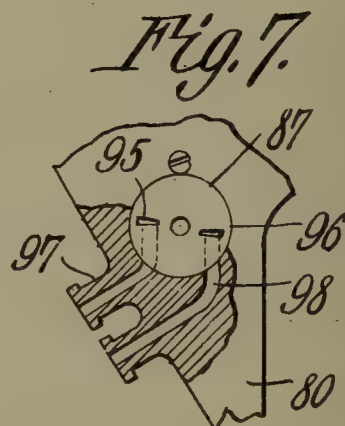
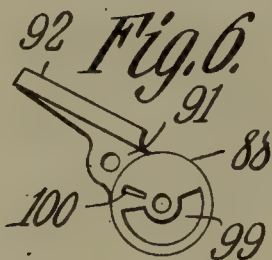
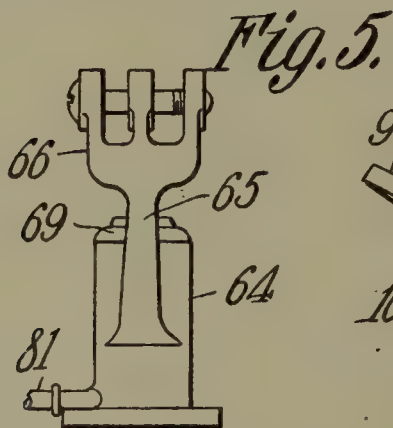
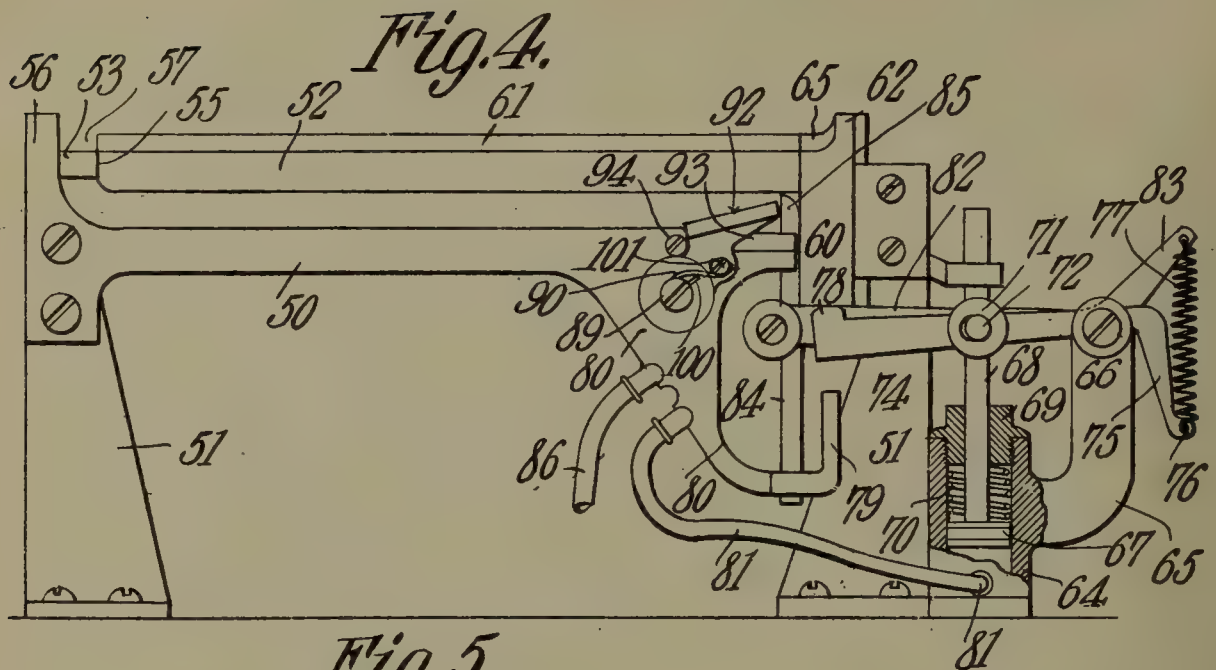


W. C. MAYO & J. HOULEHAN.

ANNUNCIATOR.

APPLICATION FILED MAY 22, 1907.

4 SHEETS—SHEET 3.

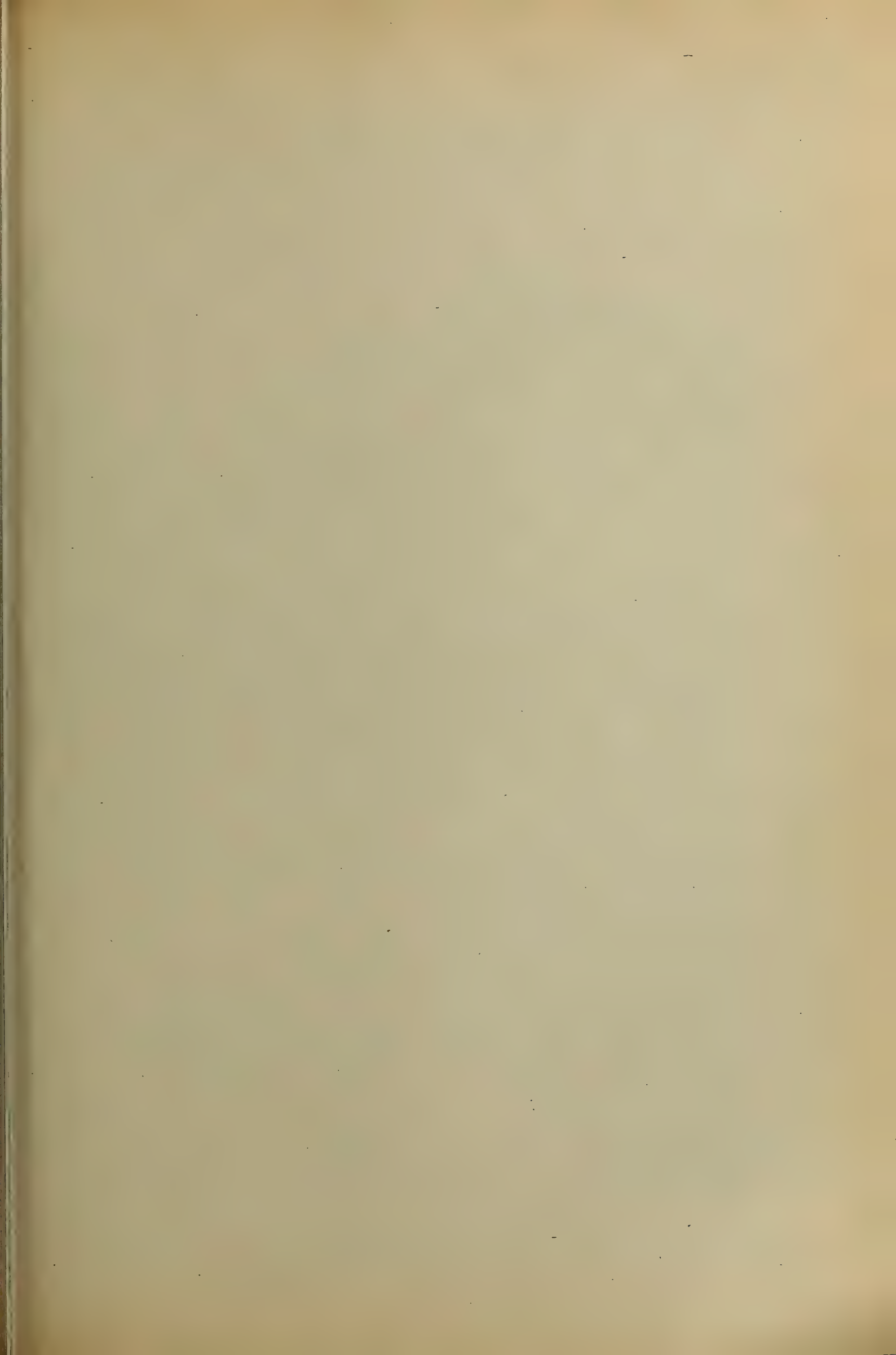


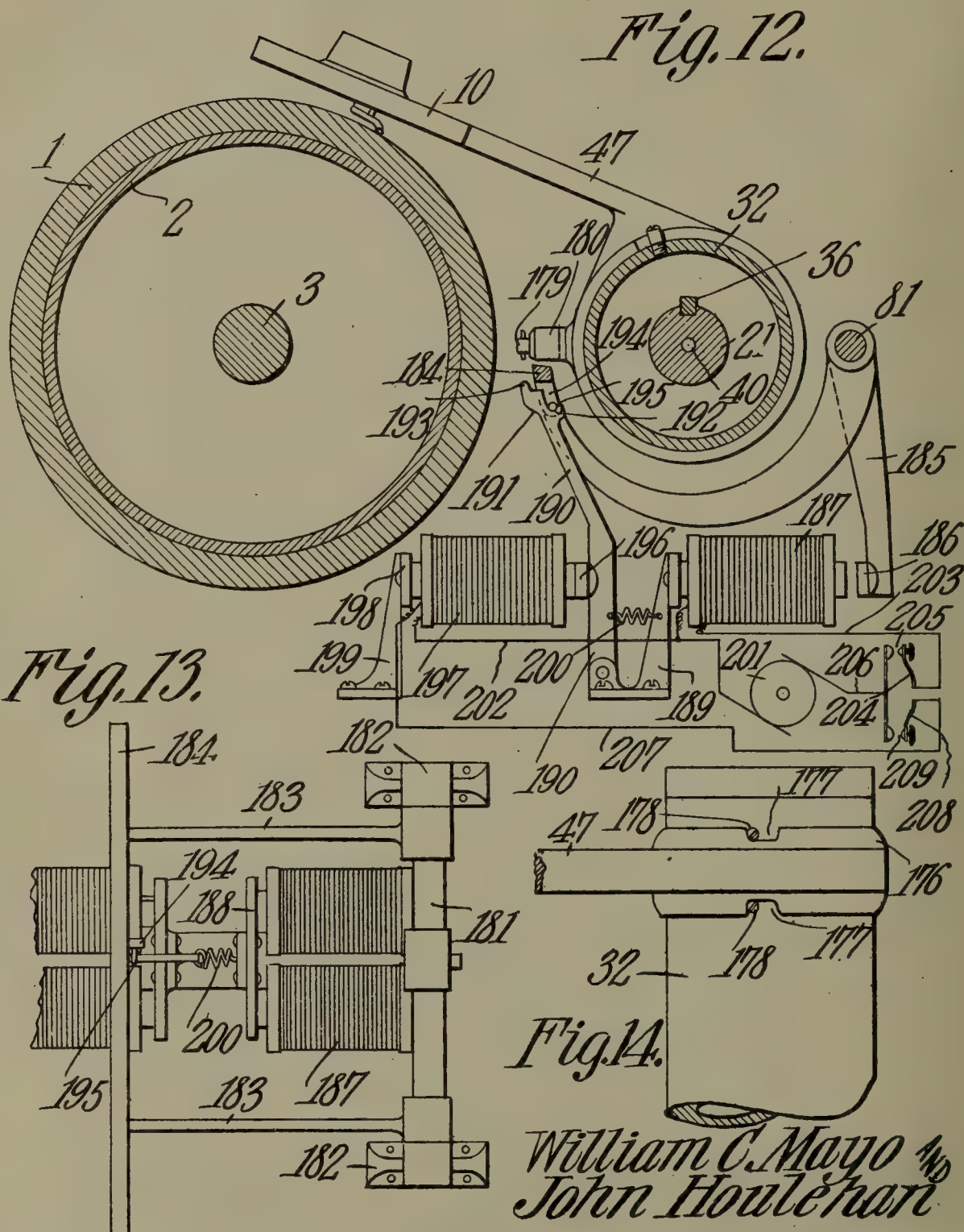
WITNESSES:

E. J. Stewart
F. J. Chapman

William C. Mayo
John Houlehan INVENTORS

By *C. A. Snow & Co.*
ATTORNEYS





WITNESSES:

E. J. Stewart
F. J. Chapman

INVENTORS

By *CA Snow & Co.*
 ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM C. MAYO AND JOHN HOULEHAN, OF EL PASO, TEXAS, ASSIGNORS OF ONE-THIRD
TO GEORGE E. BRIGGS, OF BARSTOW, TEXAS.

ANNUNCIATOR.

No. 879,288.

Specification of Letters Patent.

Patented Feb. 18, 1908.

Application filed May 22, 1907. Serial No. 375,090.

To all whom it may concern:

Be it known that we, WILLIAM C. MAYO and JOHN HOULEHAN, citizens of the United States, residing at El Paso, in the county of El Paso and State of Texas, have invented a new and useful Annunciator, of which the following is a specification.

This invention has reference to improvements in annunciators designed more particularly for the phonographic announcing of stations and other routine information on cars or trains of any character.

The invention is designed for use in connection with a complete traction system which we have devised, and since in this system the operations are mostly automatic in character, it becomes necessary that all announcements, such as the names of stations, calls to meals, and other matters which are usually called out by a train official shall be made by phonographic means and shall be so timed and arranged that each passenger shall surely hear the announcement.

In the system in which these annunciators are designed to be used it is impracticable to use spring motors for the purpose of driving the instruments and so connections are made with the air system of a train whereby the air pressure, which, in accordance with our general system is constantly maintained, is employed to drive the various parts of the annunciator and to actuate the several parts which are necessary for the fully automatic operation of the devices comprised in the present invention.

The present invention comprises a sound-reproducing means utilizing a sound record, preferably of the cylindrical type although with slight modifications the same instrumentalities may be used in connection with sound records of the disk type. In either case the sound records should be of material capable of numerous reproductions, but as such record materials are found on the market and sound record tablets have been made from such materials, it is unnecessary to consider herein the character of the record.

The invention comprises a means under the control of the air pressure in the system used for braking and other purposes, for setting up rotary motion of the cylindrical sound record and feeding the sound-box across the record to such extent and at such times as may be necessary to cause the desired announcements to be made.

In order that the announcements may be made at the proper time, the motor for the phonographic annunciator may be under the control of a release mechanism which may be operated from fixed points along the roadway; and provision is also made for conducting the reproduced sounds to points adjacent to the seats occupied by the passengers on the car so that each passenger may receive an individual announcement in spoken words.

The invention will be best understood by a consideration of the practical embodiment thereof, and, therefore, we will proceed to describe such practical embodiment in connection with the accompanying drawings forming part of this specification, in which drawings,

Figure 1 is a plan view, with parts in section, of a phonographic reproducer of the cylindrical record tablet type arranged to operate automatically as many times as desired; Fig. 2 is a skeleton view of the driving mechanism for the structure shown in Fig. 1; Fig. 3 is a cross section of the cylinder for receiving air for driving the mechanism; Fig. 4 is an elevation, partly in section, of the mechanism employed for returning the sound-box to its initial position after having traversed the length of a record cylinder; Figs. 5 to 11, both inclusive, are detail views of various parts of the mechanism; Fig. 12 is a sectional view, partly in diagram, of a means for silencing the reproduction without throwing the mechanism out of action; Fig. 13 is a plan view of a portion of the same; and Fig. 14 is a detail view of a portion of the structure shown in Fig. 12.

Referring to the drawings, and more particularly to Fig. 1, there is shown a cylindrical record tablet 1 of the ordinary type upon which there are presumed to be such announcements as desired, say the announcements of the stations being approached and their character, and such other announcements as it may be desirable to make.

Since our system contemplates the elimination, to a great extent, of train attendants, it becomes, of course, imperative that the announcements be made at the proper times and in proper sequence and that a single record should contain all the announcements that are to be made during a trip, and, in reverse order, for the return trip where it is not practicable to change the record at the end of a run. For this reason the record 1 will,

of course, be made of sufficient size for the purpose.

The record 1 is mounted upon a mandrel 2 such as is usually employed in connection with sound-reproducing machines of the cylindrical record type, and this mandrel is fast on a shaft 3 journaled in a suitable bearing 4 at one end and in a suitable bearing 5 at the other end. These bearings may be of the pointed-pin type to reduce friction and to insure the centering of the shaft. The bearing 4 may be provided with the usual gate mechanism 6 whereby the bearing may be removed from the shaft sufficiently to allow the removal and replacing of the record 1 upon the mandrel 2. Since this gate may be of the usual type, it is unnecessary to describe it in detail.

It will be seen that it is necessary that the record tablet should always be placed upon the mandrel in the same relative position thereto, and for this purpose there is secured to the smaller end of the mandrel a slotted plate 7 by means of a thumb-screw 8; or, if desired, an ordinary screw, passing through the slot in the plate 7. One end of this plate 7 is pointed, as indicated at 9, and enters a notch formed in the end of the record tablet 1.

There is provided a sound-box 10 which may be of the ordinary reproducer sound-box type, and, therefore, needs no description here, but the manner of supporting this sand-box and of operating the same to bring it into proper relation with the record will appear further on.

Between the mandrel and the bearing 5 the shaft 3 is provided with a continuous screw-thread 11, after the manner of the ordinary reproducing machine using cylindrical records, and adapted to this screw-thread there is a half-nut 12, best shown in Fig. 8. This half-nut 12 is at the end of an arm 13 terminating in two parallel fingers 14 appropriately spaced apart. The half-nut 12 is composed of a suitably shaped block seated between the fingers 14 and provided with lugs 15 projecting into slots 16 formed in the free ends of the fingers 14 so that this half-nut may move longitudinally between the fingers 14 but can have no other movement with relation thereto. It will be understood, of course, that though the lugs 15 are shown about midway of the half-nut 12 they may be otherwise located, and other means for guiding the half-nut 12 between the fingers 14 may be provided. Extending through the arm 13 between the fingers 14 is a screw 17 having an elongated, smooth shank and a short screw extension 18, which latter enters a suitable nut formed in the body of the half-nut 12 to such an extent that the shoulder formed by the junction of the shank 17 with the screw extension 18 abuts against the rear of the half-nut 12.

Surrounding the shank of the screw 17 between the half-nut 12 and the inner face of the arm 13 there is a helical spring 19 tending to maintain the half-nut in its outermost position but yielding when the nut engages with the screw-threads 11 on the shaft 3, so that the nut may be firmly seated on the screw-threads without danger of being displaced therefrom by the shocks incident to the movement of the car.

Mounted upon the end of the shaft 3 near the bearing 5 is a gear pinion 20 by means of which a rotative movement is imparted to the shaft 3 in a manner to be described with relation to Fig. 2 and to which reference will be made further on.

Parallel with the shaft 3 there is another shaft 21 which, because of the fact that it makes but a partial revolution in operation, will hereinafter be referred to as a rock-shaft. One end of this rock-shaft is carried by a pointed bearing 22 consisting of a cylindrical block housed in a fixed sleeve 23 upon a suitable support coming from the base plate of the machine, which latter is not shown in the drawings. The block 22 is provided with a reduced stem 24 extending through the sleeve 23 and also through a bushing 25 having exterior threads fitted to other threads tapped into the end of the sleeve 23, and this bushing is held in place by a lock nut 26. Surrounding the stem 24 within the sleeve 23 and confined between the end of the block 22 and the inner end of the bushing 25 there is a helical spring 27. Fast on the rock-shaft 21 adjacent to the bearing 22 is an arm 28 connected by a suitable spring 29 to a bracket 30 fixed on the support of the sleeve 23 or coming from any other adjacent fixed portion of the machine, and the spring 29 is of sufficient strength to at all times tend to rock the shaft 21 in a direction to cause the arm 28 to approach the bracket 30.

About midway of the length of the rock-shaft 21 it is formed with a piston 31 and the rock-shaft carries a hollow cylinder 32 inclosing said piston 31. That end of the cylinder 32 toward the bearing 22 is closed by a packing gland 33 inclosing suitable packing 34 to render this end of the piston air-tight where it surrounds the shaft 21. The other end of the piston is closed by a simple screw-head 35 serving to maintain the cylinder in concentric relation to the shaft 21. In order that the cylinder 32 may not turn upon the shaft 21, although movable longitudinally thereon as will hereinafter appear, the shaft 21 is provided with a spline 36 passing through a suitable slot in the head 35. This spline 36 is of sufficient length to permit the full longitudinal movement desired for the cylinder 32.

The end of the rock shaft 21 remote from the end supported by the bearing 22 is formed into a head 37, the end face of which is curved

on the arc of a circle, and this end face fits the similarly curved face of a fixed bearing 38 on the end of a standard 39 fast on the base or other fixed part of the machine. The bearing 38 is best shown in Figs. 9 and 10. Extending through the shaft 21 from the head 37 to and through the piston 31 is a conduit 40, and this conduit at the head 37 opens into a port 41. The bearing 38 is provided with a through port 42 and another port 43 alongside of the through port 42 but leading radially, by means of a duct 44, through the bearing to a coupling head 45 from which leads a pipe 46 to a source of air supply under pressure, which may be the air pressure supply for the brake system of the train and for other purposes. Now, when the rock-shaft 21 is moved about its axis in the manner to be hereinafter described, the port 41 will be brought into coincidence with one or the other of the ports 42 and 43 in the bearing head 38. The sound reproducer box 10 is secured to the cylinder 32 by means of an arm 47 so as to be supported by and move with said cylinder, and the arm 13 carrying the half-nut 12 is likewise secured to said cylinder to be supported by and move therewith.

The relation of the several parts is such that when the rock-shaft 21 is moved under the action of the spring 29 and the cylinder is likewise moved with the rock-shaft, the port 41 is brought into coincidence with the port 43 and air under pressure therefore is admitted by the conduit 40 to the side of the piston 31 adjacent to the packing gland 33. The result is that the reaction of this compressed air will force the cylinder toward the right as viewed in Fig. 1 and this movement will continue until stopped by means to be hereinafter described, which means also cause the movement of the rock-shaft 21 on its axis in a direction to bring the sound-box into operative relation with the beginning of the sound record 1 and to bring the half-nut 12 into operative relation to the screw-threads 11. This last movement of the rock-shaft 21 brings the port 41 into coincidence with the port 42 in the head 38 and as this port 42 is open to the air the supply of compressed air within the cylinder, admitted through the conduit 40, now exhausts through the port 42 and the cylinder is free to be moved under the action of the screw-threads 11 and nut 12 in a direction to cause the reproduction of the sounds recorded in the tablet 1.

In order to provide for the maintenance of the half-nut 12 in contact with the screw-threads 11 and for the maintenance of the sound-box 10 in operative relation to the record groove in the tablet 1, and to disconnect both the half-nut 12 and the sound-box 10 from their respective parts of the reproducing mechanism when the end of the record is reached, and to return the sound-box and half-nut to the beginning of the record and

screw-threads respectively and to put them in operative relation thereto, there is provided a means which will now be described, this means being shown in Figs. 1, 4, 5, 6, 7 and 11.

Fast on the cylinder 32 about midway of its length there is an arm 48 projecting in a direction opposite from that of the arms 13 and 47, and this arm 48 terminates in a roller 49. In the path of this roller there is a track 50 suitably supported upon posts 51 rising from the base plate or other fixed portion of the machine, and at a higher level and overlying the track 50 there is another track 52 secured to the track 50 by yokes 53 and to one of the standards 51 by a yoke 54, the two tracks thus being parallel but spaced apart, while, for a purpose which will hereinafter appear, the track 52 is shorter than the track 50 and terminates at one end 55 at a short distance from an upturned end 56 of the track 50 to form a throat 57 between these ends of the tracks, while at the other ends the tracks terminate in the same vertical plane. The upper end of the standard 51 adjacent to the two matched ends of the track sections 50 and 52 is formed with a dovetail slot 58 receiving a dovetail tongue 59 on a sliding block 60 movable from a position coincident with the top of the track 50 to a point coincident with the top of the track 52.

It will be observed that the top of the track 50 is level while the top of the track 52 is inclined, as indicated at 61, and the top of the block 60 is formed with an upturned stop lug 62 and the upper end of this block 60 is also inclined, as shown at 63, similar to the inclined face 61. Now, let it be supposed that the roller 49 is traveling along the inclined track surface 61. In this position the roller itself is inclined and bears evenly on said track. The direction of travel of the roller 49 under the impulse of the screw 11 is toward the left as viewed in Fig. 4, and ultimately this roller reaches the throat 57 and drops down therethrough to the track 50. Since the arm 48 carrying the roller 49 moves through an arc about the axis of the rock-shaft 21, the drop from the track 52 to the track 50 brings the roller 49 into good bearing contact with the level surface of the track 50. In this position of the parts the cylinder 32 is impelled by the air pressure toward the right as viewed in Figs. 1 and 4, and the roller therefore travels toward the right along the track 50 until it reaches the right-hand end thereof.

It is necessary now to consider the structures disposed at the right-hand end of the tracks 50 and 52. Adjacent to the corresponding standard 51 there is a cylinder 64 having formed on one side a bracket 65 terminating at the upper end in a twin-head 66. Within the cylinder there is located a piston

67 at the lower end of the piston-rod 68 passing through a suitable screw-plug 69 at the upper end of the cylinder, which screw-plug constitutes a bearing for the piston-rod 68.

5 Interposed between the upper face of the piston 67 and the lower face of the screw-plug 69 there is a helical spring 70, the purpose of which will presently appear. The upper end of the piston-rod 68 is passed through a suitable bearing formed in a bracket 71 fast in the upper end of the standard 51 at this end of the structure. The piston-rod 68 is provided with a side stud 72 engaging in a suitable bearing 73 formed in a lever arm 74 pivotally supported in one portion of the twin-head 66. This lever arm is extended beyond its bearing in the twin-head 66 and is there provided with an angle arm 75 terminating in an eye 76 receiving one end of a spring 77 to be hereinafter referred to. The other end of the lever 74 is formed into a head 78 arranged to engage under the block 60, and a stop 79 formed on one end of a bracket 80 extending downward from the track 50 is arranged in the path of this block 60 so that it may descend for only a definite distance which is sufficient to bring the track surface 63 coincident with the surface of the track 50. The lower end of the cylinder 64 receives the end of a pipe 81 coming from a valve mechanism to be presently described. The action of the spring 70 before referred to is to depress the piston 67 and thereby carry the lever 74 to its lowermost position until the block 60, which is of sufficient weight to fall by gravity, is arrested by the stop 79.

Pivotally supported in the twin-head 66 is another lever 82 having an arm 83 extending away from said head and connected to the end of the spring 77 remote from the end connected to the arm 75. The other end of the lever 82 is pivotally connected to a slide 84 mounted at the lower end in a suitable guideway in the bracket 80 and at the upper end passing through a suitable guideway in the corresponding end of the track 50 and adjacent to the block 60.

Assuming that the piston 67 is at its lowermost point of travel, the levers 74 and 82 are also depressed and the block 60 has its track section 63 coincident with the track 50, and the slide 84, the upper end 85 of which is shaped as shown, is also lowered to such an extent that the said end 85 is below the level of the upper surface of the track 50.

Returning now to the roller 49, which when last spoken of was supposed to be approaching the end of the track adjacent to the block 60. This roller, continuing its travel toward the right, ultimately passes upon the track section 63 of the block 60, being stopped by the lug 62. When the roller has reached this point it has caused, in a manner to be presently described, the air

to be admitted through the pipe 81 to the lower side of the piston 67 in the cylinder 64. This air coming from the train service pipe is under pressure and lifts the piston 67 against the action of the spring 70 and thereby causes the lever 74 to also move upward. However, the head 78 of the lever 74 is so related to the block 60 that in the initial position of the lever 74 the head 78 is some distance below the lower end of the block 60. Consequently, the lever 74 must move some little distance before it engages the block 60. This causes the arm 75 to move away from the arm 83 and thereby the spring 77 is put under tension until it overcomes the weight of the lever 82 and the slide 84, which latter is moved up until it reaches the lower side of the track 52 in which position it is in the path of the roller 49 and the latter is effectually prevented from returning to the track 50. By the time this movement has been accomplished the head 78 of the lever 74 has come in contact with the block 60 and then the continued upward movement of the piston 67 forces the block 60, together with the roller 49 and arm 48, upward until the track section 63 is coincident with the inclined surface 61 of the track 52, the end of the track 52 preventing the roller 49 from elevating the track 63 after it has passed the upper end 85 of the slide 84.

Now, in order to insure the operation of the piston 67 there is provided in the bracket 80 a valve mechanism by means of which air coming from a suitable source of air pressure through a pipe 86 is directed to the pipe 81 and then the air supply is cut off from the pipe 81 and the air in the cylinder 64 is permitted to escape. For this purpose there is mounted in the bracket 80 a rotary valve, best shown in Figs. 6 and 7. This valve consists of a fixed seat member 87 and a rotary member 88 held to the member 87 by means of a suitable screw 89, and the rotary valve member 88 is held in a certain normal position by means of a spring 90 carried by the screw 89 and engaging said rotary member 88. Fast on the rotary member 88 there is an arm 91 having an extended bearing surface 92 arranged to engage in a recess 93 in the track 50, but normally held out of this recess by the spring 90 before referred to, a stop-screw 94 determining the extent of travel of the arm 91 away from the recess 93.

The fixed member 87 of the valve is provided with two ports 95 and 96, the port 95 being in communication through a suitable duct 97 with the air supply pipe 86, while the port 96 is in communication through a suitable duct 98 with the pipe 81 leading to the cylinder 64. In the face of the valve member 88 there is formed an arc-shaped groove 99 and adjacent thereto is a through port 100. The meeting faces of the two members 87 and 88 of the valve are ground true so as to

make an air-tight joint, and the member 88 is held with its face against the face of the member 87 by means of the spring 90 which presses against the movable member 88 and holds it in close contact with the member 87.

One end of this spring may be carried around a pin or screw 101 on the member 88 in such manner as to hold it in position to close all the ports, in which position the arm 91 abuts against the pin or screw 94.

When the valve just mentioned is in its normal position the bearing surface 92 is in line with the track 50 but extends above the same in the path of the oncoming roller 49. However, in this position of the valve the ports 95 and 96 are in communication through the groove 99 and the piston 67 is therefore acted upon by the compressed air and the block 60 is in its uppermost position, as shown in Fig. 4. Moreover, the slide 84 is also elevated so that its end 85 is in the path of the oncoming roller 49. Before, however, the roller 49 reaches the stop end 85 of the slide 84 it passes upon the bearing surface 92 of the valve member 88 and, depressing this bearing surface 92, causes the valve member 88 to turn upon its axis to a sufficient extent to carry the groove 99 out of coincidence with the port 96 and to bring the exhaust port 100 into coincidence with the port 96. The air in the cylinder 64 is therefore exhausted through the port 100 and the piston 67 is depressed by the spring 70. This action causes the levers 74 and 82 to fall and the block 60 also falls until arrested by the stop member 79. Moreover, the slide 84 has likewise been depressed until its end 85 is out of the path of the roller 49. Under these conditions the track section 63 of the block 60 is in line with the top of the track 50 and the roller is free to enter this track section 63. Now, however, the roller has passed off from the bearing surface 92 of the valve member 88 and this latter member turns on its axis under the impulse of the spring 90. The first action is to connect the ports 95 and 96 with the compressed air supply and compressed air is introduced below the piston 67. This latter member then rises, first putting the spring 77 under tension and thereby causing the end 85 of the slide 84 to be projected into the path of the roller 49, thus preventing the latter from again moving on to the track 50. Immediately afterward the end 78 of the lever 74 engages the lower end of the block 60 and elevates the same, together with the roller 49, to coincidence with the surface 61 of the track 52. As before stated, the upward movement of the roller 49 acting through the arm 48 has caused the cylinder 32 on the shaft 21 to rock upon the axis of the latter, thus bring the half-nut 12 into engagement with the threads 11 and the reproducing stylus of the sound-box 10 into engagement

with the beginning of the record groove on the record tablet 1. Now, as the shaft 3 is rotated in a manner to be described the sound-box 10 is fed across the record tablet 1 until ultimately the throat 57 at the end of the track 52 is reached, when the roller 49, moving thereinto under the action of the spring 29, causes the sound-box and half-nut to be raised from the tablet and feed-screw respectively and the sound-box and feed nut are again returned so that the sound-box is in operative relation with the beginning of the record tablet in the manner already described.

Before passing on to the description of the driving mechanism for the structure just described, it may be well to note that the packing 34 for the cylinder 32 need not be thoroughly air-tight since there is a large excess of power from the air entering said cylinder and some leak at this point is immaterial. But it is material that there should be as little friction as possible in the active movement of the cylinder 32 when propelled in the proper direction to cause the reproduction of the record under the action of the screw 11, since now the air pressure no longer acts directly to furnish the propelling power, and, therefore, it is advisable to reduce the resistance at all points where there may be resistance offered to the operation of the machine. For this reason the packing 34 may be of any suitable substance that will answer the purpose and a good, loose graphite packing may be sufficient.

It will be observed that the shaft 21 has its bearing 22 constantly urged toward the shaft 21 by the spring 27. This serves to maintain the contiguous faces of the head 37 and the bearing 38 in close contact, and as these faces are carefully ground to an air-tight fit such fit is maintained by the spring 27 during the rotative movement of the shaft 21. It is advisable to retard the movement of the cylinder 32 on its return movement to the position to bring the sound-box to the beginning of the record. When the roller 49 falls through the throat 57 the half-nut 12 is not immediately lifted out of engagement with the screw 11 because of the action of the spring 19 which causes the said half-nut to remain in contact with the screw 11 until just an instant before the roller 49 reaches the bottom of the throat 57 in position to enter upon its return travel along the track 50. However, the port 43 has been brought into coincidence with the port 41 and air pressure is established in the end of the cylinder 32 beyond the piston 31. Ordinarily, the cylinder 32 would move quickly along the shaft 21 but there is quite a body of air confined between the piston 31 and the head 35 of the cylinder. This head 35 fits the shaft 21 sufficiently close to form a good bearing but there is provided a certain amount of leak. The air

confined within the cylinder 32 between the piston 31 and the head 35 therefore retards the movement of the cylinder 32 upon the shaft 21 after the manner of a dash-pot; and
 5 the return movement, therefore, of this cylinder will be only so rapid as the leak of the confined air past the head 35 will permit. A more rapid movement may be obtained by a suitably throttled by-pass for the air through
 10 this head 35, but as this is a simple mechanical expedient it is not thought necessary to show it in the drawings.

No attempt has been made throughout the drawings, either in those already considered or those to be considered, to show exact proportions, and it will be understood that the proportions and even the relations of the parts may be varied as may be found expedient in the installation of a structure embodying the present invention under the
 15 varying conditions that may prevail in practice.

When the phonographic annunciator is established upon a car an ordinary amplifying horn may be used, but by preference
 25 there will be small sound-directing horns located adjacent to each seat in the car, and these horns will be connected to sound conduits arranged along the walls of the car in any suitable manner. For instance, the annunciator may be located at any convenient point and sound-conveying tubes coming from the sound-box may be located along
 30 each side of the car with the small sound-directing horns coupled up in multiple to these tubes. As this is an evident arrangement for the purpose, it is not thought necessary to show it in the drawings.

As before stated, it is not expedient to use
 40 a spring motor for the purpose of driving the mechanism heretofore described and since in the connection in which the annunciator is designed to be used air under pressure is available, and, in fact, is necessary for the
 45 operation of certain of the structures already described, we have devised a motor especially designed for driving the mechanism connected with the sound-reproducing apparatus used in our annunciator, this mechanism
 50 having a special coaction with the other parts of the device for the proper operation of these said other parts in the manner necessary for the accomplishment of the purposes we have in view. This driving mechanism is shown in Figs. 2 and 3, to which special
 55 reference is now had. In Fig. 2 there is shown a drive shaft 3 with the pinion 20 mounted thereon, and the mandrel 2 and cylindrical record 1 are also shown. The pinion 20 is engaged by a gear wheel 102 mounted on an arbor 103 which, in turn, carries a pinion 104 adjacent to the gear wheel 102. Meshing with the pinion 104 is another gear wheel 105 mounted, in turn, on an
 60 arbor 106, which latter carries a pinion 107

meshing, in turn, with a gear wheel 108 mounted for rotation upon another arbor 109 but not connected thereto except as hereinafter set forth, and the last-named shaft carries a pinion 110. Meshing with
 70 the pinion 110 there is a rack-bar 111 extending radially from one side of a shaft 112 passing at one end through a suitable support 113 fast upon a fixed portion of the machine. This shaft passes into a cylinder 114 through
 75 a suitable packing gland 115, and within the cylinder the shaft 112 carries a piston 116. Formed on one side of the cylinder 114 is the slide-valve box 117, which may be cylindrical in shape and formed originally with
 80 one end open but shown closed by means of a screw-plug 118 over which is placed a cap 119 to protect the same and prevent malicious manipulation thereof. The other end of the valve box 117 is provided with a screw-
 85 plug 120 extending both to the interior and exterior of the valve box and covered at its outer end by a cap 121. The inner end of the screw-plug 120 is provided with an axial stud 122 forming the seat for one end of a
 90 helical spring 123, which latter, at the other end, engages a piston 124, and this spring is centered on said piston by means of a stud 125. The piston 124 is fast on one end of a
 95 piston-rod 126, the other end of which is supported by a disk 127 fitting the interior of the slide-valve box 117 sufficiently tight for guiding purposes. Between the piston 124 and the disk 127 the rod 126 carries a slide-
 100 valve 128 of usual construction, and the latter is constrained to move with the rod 126 by means of collars 129 on said rod at each end of the slide-valve. The interior of the slide-valve is hollowed out, as indicated at 130, to form a passage, similar to the
 105 slide-valves found in ordinary steam engines.

The slide-valve box 117 is in communication through a passage 131 with a source of compressed air which may be the train supply coming at seventy pounds pressure, and
 110 this air supply source may be the same as that before referred to with reference to the other figures of the drawings.

That end of the slide-valve box between the inlet opening 131 and the piston 124 is in
 115 communication with the end of the cylinder 114 remote from the end through which the shaft 112 passes by means of a passage 132 opening into the cylinder 114 and communicating with the slide valve box 117 through
 120 a port 133.

The end of the slide-valve box 117 on that side of the piston 124 engaged by the spring 123 is in communication with the other end of the cylinder 114, that is, on that side of
 125 the piston 116 connected with the piston-rod 112, by means of a passageway 134, and in this passageway there is provided a throttle-valve 135, the purpose of which will hereinafter appear.

At the end of the cylinder 113 through which the piston-rod passes there is an end extension 136 in which is formed a chamber 137. The wall 138 of this chamber adjacent to the cylinder 114 is provided with a through passage formed into a valve seat in which normally rests a valve having a stem 140 supported by an upright 141 on the interior of the cylinder 114 and this stem 140 extends into the interior of the cylinder 114 for a sufficient distance to be engaged by the piston 116 when it approaches the gland end of the cylinder 114. The valve 139 has an axial extension 142 on the side opposite the stem 140 and this extension is seated in a suitable socket formed in a screw-plug 143 in the outer end wall of the chamber 137, and this screw-plug is protected by a cap 144 similar to those before mentioned. Extending from the inlet opening 131 of the slide-valve box 117 is a passage 145 leading to the chamber 137, so that the air pressure within the chamber 137 is the same as that within the slide-valve box 117.

Referring once more to the gear-train, the arbor 109 has fast thereon in addition to the gear 110 a ratchet wheel 146. Of course, the gear wheel 108 may be fast upon the arbor 109 and the ratchet 146 and pinion 110 may be formed in one piece and secured together and mounted loosely on the arbor 109. Pivotaly supported on the gear wheel 108 are a number of pawls 147 arranged to engage the teeth on the ratchet wheel 146 and maintained in normal contact therewith by springs 148. Now, when the piston 116 is moved toward the gland end of the cylinder 114 in a manner to be hereinafter described, the rack 111, engaging the pinion 110, will cause the latter to rotate and the said pinion 110, being fast on the ratchet wheel 146 either directly or through the arbor 109, will impart rotation to said ratchet wheel 146. Under these conditions, the pawls 147 are in engagement with the teeth on the ratchet wheel 146, and, therefore, the gear wheel 108 participates in the movement imparted to the pinion 110 by the rack 111. As the parts are viewed in Fig. 2, the movement of the gear 108 is counter-clockwise. The rotation of the gear wheel 108 imparts motion to the other gear wheels 105 and 102 in order, and finally this motion is imparted to the shaft 3 which drives the sound reproducer and the tablet operating in conjunction therewith. When the piston 116 moves in the opposite direction, that is, away from the gland end of the cylinder 114, the rack-bar 111 rotates the pinion 110 and ratchet wheel 146 in the opposite direction but, as will be readily understood, the pawls 147 are now inactive and the gear wheel 108 and the rest of the gear train remain stationary. It may be here stated that this motive apparatus is designed to cause a sufficient number of rota-

tions of the record cylinder 1 to reproduce all the recorded sounds thereon from one end to the other by the movement of the piston 116 on its power stroke once through the length of the cylinder 114. Now, let it be assumed that the piston 116 is in the cylinder at the end remote from the gland end. Under these circumstances, compressed air entering through the opening 131 into the interior of the slide-valve box 117, acting against the piston 124, holds the slide-valve 128 in a position to clear the port 133. The compressed air therefore enters back of the piston 116 and urges the same toward the gland end of the cylinder 114. This movement continues until ultimately the piston 116 reaches the valve stem 140 when a still further movement of the piston 116 opens the valve 139 against the air pressure in the chamber 137 and puts the said air chamber 137 in communication with the piston-rod side of the piston 116. The pressure on both sides of the piston now begins to equalize and the compressed air coming from the chamber 137 also travels through the passage 134 to the spring side of the piston 142 but because of the throttle valve 135, which may be properly adjusted for the purpose, the air pressure on the spring side of the piston 142 accumulates but slowly owing to the sluggish passage of the compressed air into the slide-valve box on the spring side of the piston 124, and the air on the piston-rod side of the piston 116 has time to come up to full pressure. Now, when the pressure in the slide-valve box on the spring side of the piston 124 has become sufficient, the said piston 124 is moved by the spring 123 to a position to close the port 133 to the air pressure and couple this port to an exhaust port 149 communicating with the external atmosphere. The air pressure on the piston-rod side of the piston 116 now returns that piston to its normal position, causing the pinion 110 and ratchet disk 146 to revolve idly. The proportions of the parts are such that by the time the piston 116 has reached its initial position at the rear of the cylinder 114 the pressure in front of it has reduced to about or very little above atmospheric pressure.

During the forward motion of the piston 116 the air in front of this piston has leaked out through the gland 115, the packing of which is purposely made somewhat loose to permit this leakage, but this leakage is too small to have any material effect when the air pressure is established in front of the piston, and the same is true with regard to the piston 124. The piston 116 has been moved rapidly to the initial position and the pressure in front of it has rapidly dropped but the pressure on the spring side of the piston 124 has not dropped rapidly because of the throttling action of the valve 135, which latter is so constructed as to be turned

to any desired position to control its throttling action. The result of this is that the piston 116 will reach its initial position before the pressure on the spring side of the piston 124 has dropped to such an extent that the pressure on the other side of this piston is able to overcome the resistance of the spring 123 and move the slide-valve sufficiently to again open the port 133 to the compressed air supply. In the meantime, and while the piston 116 is moving away from the forward position toward the rearward or initial position the drop in pressure on the front side of the piston 116 has caused the valve 139 to be seated and thus prevent any more compressed air reaching the front side of the piston from the chamber 137.

In considering the forward movement of the piston 116, whereby motion is imparted to the gear train and so to the sound-reproducing mechanism, it is to be noted that in the practical operation of the invention this motion is not continuous but intermittent, and the parts are so proportioned that one forward power stroke of the piston will occupy the time taken for the entire run of a car through the entire distance covered by the announcements contained on the record cylinder 1. Now, in order to provide for the starting and stopping of the phonographic reproducer mechanism at the proper times, we have devised the instrumentalities which we will now proceed to describe.

Secured upon the spokes of the gear wheel 105 there is an annulus 150 having on its periphery a number of spaced teeth 151 equi-distantly disposed. These teeth are formed on one side with abrupt shoulders radial to the axis of the gear wheel 105, and on the other side these teeth are approached by easy curves.

In mesh with the gear wheel 102 is a pinion 152 mounted on a shaft 153 which may be termed the governor shaft since this shaft carries an ordinary type of speed governor such as is ordinarily used in sound-reproducing machines or in other such structures. Since this governor may be of any approved type and in itself forms no part of the present invention, it has been omitted from the drawings. On the governor shaft 153 there is mounted a disk 154 against the periphery of which a suitable brake may be made to engage. In the drawings this brake is shown in the form of a pad or block 155 of suitable material, such as leather, projecting from a suitable seat in a cup 156. This cup is carried in the end of a screw 157 passing through a boss 158 formed on the end of an arm 159. A finger 160 is formed on one side of the boss 158 and serves to guide and prevent the turning of the cup 156 when adjusted to or from the disk 154 by the screw 157.

A small set-screw 161 may be used to

clamp the screw 157 in its adjusted positions. The arm 159 constitutes one arm of a lever 162 pivoted at 163 to a suitable fixed portion of the framework of the machine. The lever 162 is under the control of a spring 164, the normal tendency of which is to move the brake pad 155 away from the brake disk 154, and the arm 159 is thinned so that when the brake pad 155 is in engagement with the brake disk 154 it presses against the same with a yielding or elastic pressure. The other end of the lever 162, that is, the end remote from the arm 159, carries another lever 165 by means of a pivotal screw 166. The shorter arm 167 of the lever 165 is appropriately bent and carries a roller 168 in the path of the teeth 151 on the annulus 150. The longer arm of the lever 165 is connected to the longer arm of the lever 162 by a spring 169, and a stop-screw 170, mounted on a stud 171, limits the extent of movement of the lever 165 under the action of the spring 169, while a set-screw 172 locks the stop-screw 170 in any adjusted position.

The lever 165 carries at the end remote from the arm 167 an armature 173 in operative relation to the core 174 of an electro-magnet 175. The circuit connections in which this electro-magnet is included are not shown in the drawings. It suffices to state, however, that this magnet may be in a suitably charged circuit receiving current from the power circuit on the car or from individual sources of current such as batteries, or in any suitable manner, and provision is made to close this circuit at intervals along the line of travel so that the magnet may be energized at predetermined points during the run of a car. In the normal position of the several parts the roller 168 rests against the outer end of a tooth 151 and the lever 162 is then in such position that the spring 164 is under tension and the brake pad 155 is in contact with the periphery of the brake disk 154, thus holding the latter against movement. Now, let it be supposed that a car has reached a point within a certain distance of a station and that by any suitable means the circuit of the magnet 175 has been closed so that the magnet is energized. The armature 173 is pulled over toward the magnet 175 and this causes the roller 168 to be pulled out of the radial line of the tooth with the end of which it was in engagement. The spring 164 is now free to act and pulls the lever 162 in a direction to cause the roller 168 to move toward the annulus 150 along the abrupt shoulder of the respective tooth 151. The movement of the lever 162 pulls the brake shoe or pad 155 away from the brake disk 154 and thus releases the gear train. Now, let it be assumed that the piston 116 is in its initial position and air pressure is established behind it. The gear train now being unlocked will start its movement under

the stress of the compressed air behind the piston 116. In the meantime the magnet 175 has become deenergized. The roller 168 now rides upon the periphery of the annulus 150, in which position the brake shoe or pad 155 is free from the disk 154. The movement of the gear train continues until the next tooth 151 is reached, when the easy slope of this tooth will engage the roller 168 and move the lever 162 around its pivot against the stress of the spring 164 and ultimately bring the pad or shoe 155 into contact with the disk 154 with sufficient force to stop the rotation of the gear train. When the next station or point where an announcement is to be made by the phonographic reproducer is reached the magnet 175 is again energized and the operation just described is repeated, the piston 116 advancing an appropriate distance under the action of the compressed air. And so from time to time the gear train is released whenever a predetermined point is reached, and the announcements contained on the record cylinder 1 are reproduced. The number of teeth on the annulus 150 depends on the announcements to be made, which, of course, will depend upon the conditions under which the annunciator is established; that is, there may, for example, be ten teeth on the annulus 150 and the gear carrying it may make ten revolutions during one movement of the piston 116 and one revolution of the gear wheel driven by said piston and its connections, and thus the number of announcements made may then be ten times the number of teeth 151.

The construction is such that when all the announcements to be made have been made the piston 116 will have made one full power stroke and it will then automatically return to its initial position. Because of the slow movement of the piston during its power stroke it will be seen that the air in front of it easily escapes through the packing in the gland 115 and that this packing, while loose enough for such purpose, may be sufficiently tight to prevent undue leakage when the compressed air enters the cylinder in front of the piston through the valve 139.

From the foregoing it will be seen that in a system in which our present invention is embodied all announcements are made automatically without danger of confusion; and being produced from a phonographic record and directed to points close to each passenger, these announcements will be clearly understood by each passenger on a car or train. It will also be understood that in the foregoing description we have used the terms "phonograph" and "phonographic reproducer" in the broad sense of sound reproducers and that these terms are not to have a narrower sense as applied to any particular type of sound-reproducing machines.

It sometimes transpires that it is desirable

to silence the reproducing parts of the annunciator without, however, stopping the action of the other parts. For instance, assume that the structure is mounted upon a sleeper. When the passengers are asleep it is desirable, of course, that they be not disturbed by the various announcements which would be made from time to time as the train passes stations, but at the same time the apparatus as a whole cannot be stopped, for, being automatic in its operation, it would get out of step. Therefore, we have devised means whereby the reproducer may be held out of operative relation with the record tablet so long as may be desired but will still be advanced along said tablet to the same extent as though the reproducer was in active operation. Then when it again becomes desirable to place the reproducer in operative relation to the tablet it will be in the proper relation thereto and continue the reproductions at the proper point, as though it had been in operative relation to the tablet during the intervening time.

Referring, now, to Fig. 12, 13 and 14, it will be seen that the arm 47 is not fast upon the cylinder 32 in the strictest sense of the word but is fast upon a collar 176 mounted upon said cylinder 32 for a very limited rotative movement about said cylinder. This independent movement, however, is not sufficient to prevent the lifting of the reproducer head from the record during the return movement to the initial position at the commencement of the record. The collar 176 has on each side short recesses 177 through which pass screws or studs 178 projecting from the cylinder 32, so that the collar 176, while confined to one plane, may move about the cylinder 32 in such plane for a very limited distance, depending upon the length of the recesses 177.

Projecting from one side of the collar 176 is a stud 179 carrying a roller 180. Upon the other side of the cylinder 32 opposite the roller 180 is a horizontal rock-shaft 181 mounted at its ends in journal bearings formed in standards 182 which may rise from the base plate supporting the entire structure. Fast upon the shaft 181 near its ends and adjacent to the journal bearings in the standards 182 are curved arms 183 bent so as to pass down under the cylinder 32 and thence up, and at the ends of these arms 183 remote from the shaft 181 they carry a track 184 in the path of the roller 180 and of sufficient length to engage said roller under conditions to be hereinafter named, during the entire length of travel of the reproducer over the record. Fast upon the shaft 181 is a depending arm 185 carrying at its free end an armature 186 in operative relation to the poles of a horseshoe electro-magnet 187, the yoke 188 of which is fast upon a post or bracket 189 secured to the base plate of the machine, which

base plate, however, is not shown in the drawings. Pivottally secured to the base of the bracket 189 is another arm 190 extending upward and suitably bent for the purpose and terminating in a head 191 formed at a short distance below its upper end with a notched off-set 192 on one side and at the extreme upper end with a supporting end and limiting finger 193. The upper end of the head 191 is shaped to receive and hold the track 184, and about midway of the length of this track it is formed with a short, depending bracket 194 carrying a pin 195 arranged to be caught by the notch of the off-set 192. The arm 190 carries an armature 196 in operative relation to another horseshoe magnet 197, the yoke 198 of which is fast upon a standard 199 which may rise from and be fast to the base plate of the machine. The arm 190 is connected to the post or standard 189 by a helical spring 200 tending at all times to draw the armature 196 away from the magnet 197.

There is provided a suitable source of current, indicated at 201, and this source may be and preferably is the prime current source of the car, which source forms a part of our complete traction system. Both magnets 187 and 197 are connected to a conductor 202 leading from one side of the current source 201. The magnet 187 is connected on its other side by a conductor 203 to one member 204 of a push-button or switch 205, the other terminal of which is connected by a conductor 206 to the other side of the current source. The magnet 197 also has the terminal remote from that connected to the current source, connected by a conductor 207 to one member 208 of a push-button or switch 209, likewise connected by the conductor 206 to the current source.

In the normal operation of the structure the track 184 is out of engagement with the roller 180 and is then supported by the engagement of the pin 195 with the notched off-set 192 of the arm 190. Under these conditions, the mechanism will operate to make the announcements audibly in the manner already described. Now, let it be supposed that it is desirable to silence the annunciator without stopping its operation or putting it out of step. For this purpose it is only necessary to complete the circuit at the push-button or switch 205, when the magnet 187 will be energized and its armature 186 will be attracted. By this means the arm 185 is drawn toward the magnet 187, thus causing the shaft 181 to rock in its bearings and the track 184 is thereby lifted until it engages the roller 180 and causes the collar 176 to be rotated about the cylinder 32 to the extent permitted by the length of the recesses 177. This movement is sufficient to lift the reproducer head 10 out of operative relation with the record tablet 1, but does

not interfere in the least with the operation of the remainder of the structure, so that the reproducer head is moved from time to time the same as though it were in engagement with the record 1. It may be noted that the upper face of the track 184 is slightly beveled, so that when in engagement with the roller 180 and the latter has been lifted as described, it may engage evenly with the bearing surface of the track.

When the track 184 is lifted the pin 195 participates in the movement and thus is lifted out of the notched off-set 192 and moved upward alongside of the head 191 until the upper end thereof is reached, when, under the action of the spring 200, the arm 190 is moved to an extent to cause the head 191 to ride under the pin 195 until stopped by the tooth 193. The track is therefore locked in the elevated position, so that the push-button 205 can then be safely released to open the circuit at that point. Suppose, now, that the time period during which it is desirable to silence the annunciator has passed. The push-button or switch 209 is now manipulated to close the circuit from the current source 201 and then the magnet 197 is energized, thus drawing the armature 196 toward it and with this armature the arm 190 against the action of the spring 200. This movement of the arm 190 will draw the head 191 from under the pin 195 and thereby permit the track 184 to fall by gravity until the pin 195 is caught by the notch in the off-set 192 and the track will be held in this lowered position by said off-set. Thus, at any time desired it is possible to stop the audible action of the annunciator without interfering in the least with the continued action of the rest of the mechanism of such annunciator. Therefore, when the annunciator is again put into audible operation the announcements will begin at the proper point the same as though the audible parts of the annunciator had not been put out of action.

We claim:—

1. In an annunciator, a phonographic reproducer, a motor for driving the same, an escapement for releasing the motor to cause the phonographic reproducer to reproduce a portion only of the record, means for operating said escapement at predetermined intervals, and means independent of the driving motor for the reproducer for automatically returning the reproducer mechanism to the initial position after having completed the entire reproduction from the record tablet.

2. An annunciator comprising a phonographic reproducer, a compressed air motor therefor, a train of gear driven by the compressed air motor and in turn driving the phonographic reproducer mechanism, a toothed member actuated by said gear train, a brake mechanism controlling the gear train,

and an escapement mechanism coacting with the toothed member and the brake for releasing the motor to a predetermined limited extent of movement.

3. An annunciator comprising a phonographic reproducer, a reciprocating, compressed-air motive element, a gear train between the motive element and the phonographic reproducer mechanism, and connections between the motive element and the gear train for imparting motion thereto in one direction only.

4. An annunciator comprising a phonographic reproducer, a reciprocating, compressed-air motive element, a gear train between the motive element and the phonographic reproducer mechanism, connections between the motive element and the gear train for imparting motion thereto in one direction only, and means for automatically returning the motive element to its initial position.

5. In an annunciator, a phonographic reproducer, a gear train connected thereto, a compressed-air motive element having an active movement in one direction for impelling the gear train and an inactive movement in the other direction, means for automatically directing compressed air to cause the active movement of the motive element and inactive movement thereof in sequence, and an escapement for the gear train releasing the same to move at any one time for a portion only of the extent of travel of the power stroke of the motive element.

6. An annunciator comprising a phonographic reproducer, a gear train connected therewith, a reciprocating, compressed-air motive element, connections between the latter and the gear train active during the movement of the motive element in one direction only, automatic means for returning the motive element to its initial position under the action of compressed air, a toothed element on the gear train, a brake controlling the gear train, a spring-actuated lever carrying a brake shoe and coacting with the brake mechanism and armature lever carried by the brake lever and having a member in operative relation to the teeth on the toothed member, and an electro-magnet for controlling the armature.

7. An annunciator comprising a phonographic reproducer, a gear train connected therewith, a motive element for the gear train comprising a reciprocating member connected to the gear train during its movement in one direction and inactive to the gear train during its movement in the other direction, a spring-actuated slide-valve mechanism operating under differential air pressure to supply compressed air for the power stroke of the reciprocating member, a valve operated by the reciprocating member on the completion of its power stroke to

admit compressed air to return the reciprocating member to its initial position, slugs acting means for destroying the differential pressure on the slide-valve operating means, and an escapement mechanism for the gear train acting intermittently thereon to cause the starting and stopping of the gear train a number of times during the power stroke of the motive element.

8. In an annunciator, a phonographic reproducer mechanism, a gear train connected to the same, a motive element for driving the gear train, a brake element connected to the gear train, a toothed member carried by the gear train, a brake lever coöperating with the brake element, an armature lever carried by the brake lever and in operative relation to the toothed member, and an armature magnet controlling the armature.

9. An annunciator comprising a phonographic reproducer, a compressed-air motor for driving the same, and means independent of the motor but under the control of compressed air for returning the reproducer sound-box to the beginning of the record tablet after having completed its extent of travel over the latter.

10. In an annunciator, a phonographic reproducer, a feed-screw and feed-nut therefor, a sound-box, a reciprocating cylinder carrying the sound-box and feed-nut, a rock-shaft carrying the cylinder, a piston on said rock-shaft and located within the cylinder, a spring tending to lift the sound-box and feed-nut out of operative relation with the record and feed-screw, respectively, automatic means for controlling the relation of the sound-box and feed-nut to the sound-record and feed-screw, respectively, and a valve mechanism under the control of the rock-shaft for admitting compressed air to the cylinder and exhausting it therefrom.

11. In an annunciator, a phonographic reproducer, and means for moving the sound-box and feed-nut into and out of operative relation with the sound-record and feed-screw, respectively, comprising a rock-shaft, a cylinder movable longitudinally thereon and constrained to rotate with said shaft, means for rocking the shaft on its axis at the beginning and end of the travel of the sound-box along the record, a piston on said rock-shaft within the cylinder, and ports controlled by the movement of the rock-shaft for admitting compressed air to the interior of the cylinder and for exhausting it therefrom.

12. In an annunciator, a phonographic reproducer, means for returning the reproducer sound-box to its initial position after having passed over the record, comprising a rock-shaft, a cylinder movable longitudinally thereon and constrained to move with said rock-shaft about the axis of the latter, means for rocking the said shaft on its axis at the

extremes of travel of the sound-box, a piston formed on the rock-shaft and housed in said cylinder, a valve head formed on one end of the rock-shaft and communicating with the cylinder through said rock-shaft to the remote side of the piston, a ported seat for the valve head for supplying compressed air to the interior of the cylinder and exhausting the same therefrom, and a bearing for the other end of the rock-shaft comprising a longitudinally movable journal in the shaft and a spring tending to maintain the valve head of the rock-shaft in its seat.

13. In an annunciator, a phonographic reproducer, means for disconnecting the sound-box and the feed-nut from the record and feed-screw, respectively, at the end of the reproduction and for returning these parts to their initial position and again placing them in operative relation, and means for controlling the sound-box and feed-nut return means consisting of an arm fast to said return means, a track in which said arm travels, another track parallel thereto for said arm, and means for moving the arm from one track to the other comprising an elevator track section, a compressed air actuating device therefor, and a valve under the control of the arm for admitting compressed air to the elevator control means after the arm has passed thereon.

14. In an annunciator, a phonographic reproducer, a rock-shaft, a cylinder movable longitudinally thereon and constrained to move with said rock shaft about its axis, connections between said cylinder and the sound-box and feed-nut of the phonographic reproducer, means for admitting compressed air to cause the cylinder to move longitudinally on said shaft in a direction to return the sound-box and feed-nut to their initial positions, an arm on said cylinder, parallel tracks for said arm, means for moving said arm from one track to the other to lift the sound box and feed-nut out of operative relation to the sound-record and feed-screw respectively, a member for moving the arm from one track to the other, a valve in the path of the arm and moving on the track in a direction to return the phonographic members to their initial positions, and a compressed-air motive element under the control of said valve for moving the arm from the track in the path of which the valve is located to the other track and at the same time rocking the shaft to bring the reproducer sound-box and feed-nut into operative relation with the sound-record and feed-screw, respectively.

15. In an annunciator, a phonographic reproducer, means for driving the same, an escapement for releasing the driving means to cause the phonographic reproducer to reproduce a portion only of the record, means

for moving the sound reproducing portions of the mechanism out of action and for returning them into action without affecting the progressive operation of the other portions of the mechanism.

16. In an annunciator, a phonographic reproducer, means for driving the same, an escapement for releasing the driving means to cause the phonographic reproducer to reproduce a portion only of the record, means for operating the said escapement at predetermined intervals, means for automatically returning the reproducer mechanism to the initial position after having reached the end of the record tablet, and means for moving the reproducer out of operative relation with the record and for returning it into operative relation with the record without affecting the progressive operation of the remainder of the mechanism.

17. An annunciator comprising a phonographic reproducer, a motor for actuating the reproducer mechanism, an escapement for the motor intermittently actuated and constructed to permit the reproduction of a portion only of the record at each action of the escapement mechanism, means for moving the reproducer head out of operative relation with the record without disturbing the action of the rest of the mechanism, and means controlled from a distance for effecting such movement of the reproducer head.

18. In an annunciator, a phonographic reproducer, means for setting the same into operation intermittently, and electrically controlled means for moving the reproducer head out of and into active operation without affecting the progressive operation of the remainder of the mechanism.

19. In an annunciator, a phonographic reproducer, means for intermittently actuating the same to reproduce a portion only of the record at any one time, and means for moving the reproducer head into and out of operative relation with the record without affecting the progressive operation of the reproducer actuating mechanism comprising a mounting for the reproducer head having a limited free movement, a track for supporting the reproducer mounting in the inactive position, a lock for holding said track to maintain the reproducer in the inactive position, and electro-magnetic means for actuating the track and lock.

20. In an annunciator, a phonographic reproducer, means for intermittently actuating the same to reproduce a portion only of the record at any one time, and means for moving the reproducer head into and out of operative relation with the record comprising a mounting for the reproducer head having a limited free movement, a track for supporting the reproducer mounting in the inactive position, a lock for holding said track to

. maintain the reproducer in the inactive position, electro-magnetic means for moving the track into engagement with the reproducer mounting to move the said reproducer out of
5 action, electro-magnetic means for operating the lock for the track, and electric circuits controlled from a distance and including the said electro-magnetic operating means.

In testimony that we claim the foregoing as our own, we have hereto affixed our signatures in the presence of two witnesses.

WILLIAM C. MAYO.
JOHN HOULEHAN.

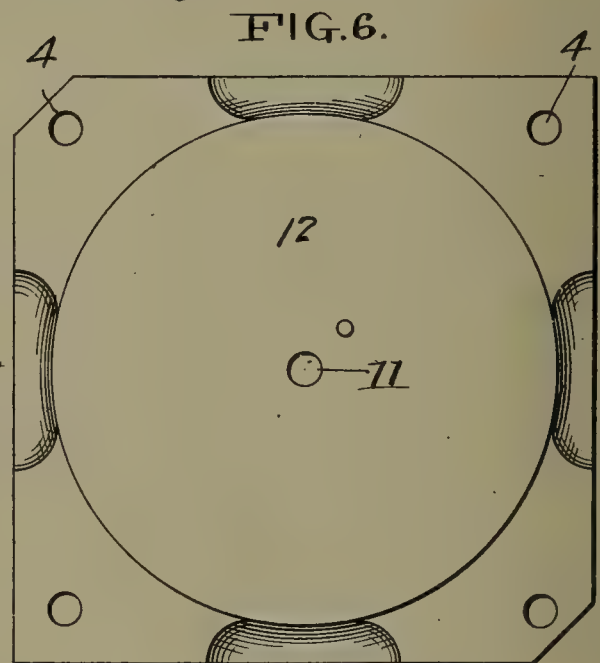
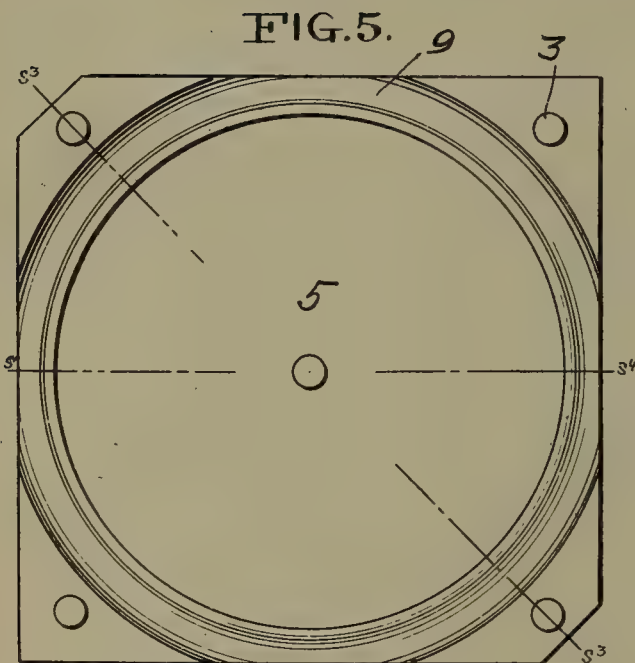
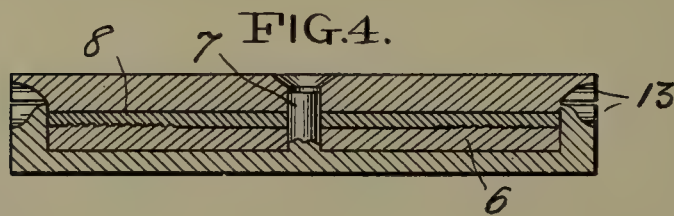
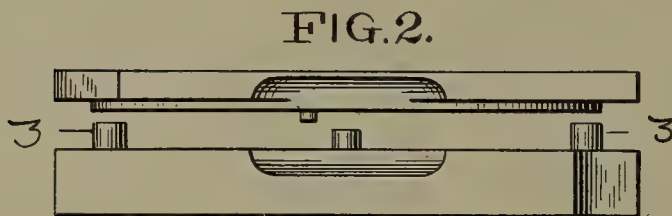
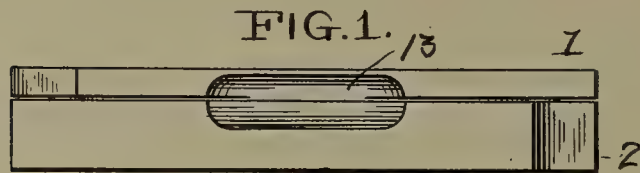
Witnesses:

W. A. WARNOCK,
JOHN L. SPADER.

No. 879,363.

PATENTED FEB. 18, 1908.

G. K. CHENEY.
DIE PLATE FOR STAMPING UP SOUND RECORDS.
APPLICATION FILED JUNE 6, 1903.



WITNESSES:
Wm. H. O'Connor
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INVENTOR
George K. Cheney
BY *A. H. Smith*
ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE K. CHENEY, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

DIE-PLATE FOR STAMPING UP SOUND-RECORDS.

No. 879,363.

Specification of Letters Patent.

Patented Feb. 18, 1908.

Application filed June 6, 1903. Serial No. 160,436.

To all whom it may concern:

Be it known that I, GEORGE K. CHENEY, a citizen of the United States of America, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Die-Plates for Stamping Up Sound-Records, of which the following is a specification.

My invention relates generally to the production of commercial sound records and more particularly to the construction, etc., of die plates employed in connection with the press by which such records are ordinarily stamped up.

The object of the invention is to produce a pair of coöperating die-plates, by which a record may be stamped up and finished ready for the market, in a single operation of the press, thereby avoiding the necessity of subsequently trimming and polishing the same, as is now ordinarily required.

A further object of the invention is to prevent premature contact between the die plates, as the record is being stamped up, in order to obtain the full and continued effect of the pressure applied upon the material and thereby produce a sharp, clean-cut impression, smooth and free of surface inequalities and having the requisite density throughout the body of the record disk.

One form of apparatus suitable for carrying my invention into effect, is illustrated in the accompanying sheet of drawings, throughout the several views of which like numerals indicate corresponding parts.

In these drawings: Figure 1 is a view of the die-plates assembled. Fig. 2 is a similar view showing the plates separated. Fig. 3 is a sectional view taken on the line s^3-s^3 , of Fig. 5. Fig. 4 is a similar view taken on the line s^4-s^4 , of Fig. 5. Fig. 5 is a plan view of the lower plate, and Fig. 6 is a reverse plan of the upper plate.

Referring now to the drawings, 1 and 2, represent the die-plates, which are caused to register one with the other by means of dowels 3, 3, 3, of the lower plate engaging sockets or openings 4, 4, 4, in the upper plate. Opposite corners of the plates are cut off as shown, to facilitate their separation for the removal of the completed record when taken from the press.

The lower plate is provided with a circular

recess 5, suitable for containing a matrix 6, which is centered therein on a pin 7. The recess is of suitable depth to receive above the matrix a layer of composition or other material 8, from which the record is to be formed.

A groove 9, concentric with and adjoining the recess, serves to receive the surplus material which overflows when pressure is applied and from this groove an outlet 10, is provided at each side of the plate.

The upper plate has formed centrally thereof a guide opening 11, which is engaged by the projecting end of the centering pin 7. In assembling the plates, etc., a small amount of composition is usually forced into this opening by the pin in entering the same and unless removed, such material will be trapped and compressed between the end of the pin and the head of the press and as no outlet is provided, an increase in the pressure frequently results in bending or breaking the plates. In order, therefore, to prevent injury to the pin or plate when in the press under pressure, the opening 11, is tapered or flared at its outer end to provide ample space to accommodate any composition which may be forced upward by the pin in entering the same. The lower surface of the upper plate is cut away or reduced to form a disk-like plunger 12, which telescopes within the recess 5, of the lower plate, such telescoping action being limited and checked as the corners of the plates come into contact, so that the records may be made of substantially uniform thickness.

At each side, the upper plate is undercut to provide additional clearance in the outlets from the overflow groove, as indicated at 13, and it is also provided with a short stud 14, projecting from its under side, which serves to form a socket in the record disk, with which a pin on the rotating table of the reproducing machine engages, to key the disk to same.

The method of operation is as follows: The die plates and matrix are first heated, to avoid chilling the composition, and in assembling the same, the matrix is placed in the circular recess of the lower plate and covered by a layer of composition, which has been previously softened or rendered plastic by the application of heat or other-

wise. The upper plate is then added and so adjusted that the dowels and center pin of the lower plate enter or register with the openings thereof. Thus assembled, the plates are placed in the press and as pressure is applied, the surplus material is at once cut away by the plunger of the upper plate entering the recess of the lower plate and such surplus falls into the overflow groove, from which more or less of it may escape through the outlets in the sides, as the pressure is increased. As the plunger portion enters the recess in the lower plate to a greater and greater extent, the outlet for the surplus material is made to be a longer and longer passage, thereby increasing the friction between said material and the edges of the portions of the dies referred to. This action results in a gradual increase in pressure of the material above the matrix until the maximum is reached. Such pressure being that which will effectually finish the plate and give the same the requisite density. Owing to the telescoping action of the die plates, they are prevented from coming into contact and checking the pressure prematurely and the entire pressure is thus concentrated upon the interposed blank or layer of material, which results in forcing the same into such intimate contact with the record surface of the matrix, as to insure a sharp, clean-cut impression. As the plates seldom come in contact under the pressure ordinarily required to give the record disk the desired density and finish, all risk of breaking or fracture is avoided. Upon reducing the pressure, the plates are taken from the press and forced apart to remove the record disk, which is completely finished, ready for the market.

The advantages of the invention will be apparent from the foregoing description.

I do not wish to be understood as limiting myself to the details of construction, etc. herein shown and described, as various changes might be made without departing from the spirit and scope of my invention. For example, by increasing the depth of the recess in the lower plate sufficiently and providing the same at suitable points around the walls thereof with requisite outlets, an ordinary plunger in part with or attached to the press might be substituted for the upper plate. The composition instead of being placed between the telescoping members by hand might be fed in automatically either as disk blanks or in sheet or other form. The dowels and openings with which they engage might be dispensed with, by detachably securing the telescoping members in proper relation in the press. All such changes, however, I consider obvious and immaterial variations of form and not of substance, and still within the meaning of the present invention.

Having, therefore, described my invention, I claim:

1. In an apparatus for molding sound records, the combination with a recessed die plate having its surface adjacent to the recess depressed to provide a clearance for the over-flow, a second die plate, a plunger with vertical walls adapted to telescope with the recess in the first mentioned die plate, and to allow the escape of surplus material, said plunger being further provided with an opening, enlarged at its upper end, through the central portion thereof, and a pin or projection located in the recess of the first mentioned die plate and adapted to cooperate with said opening.

2. In an apparatus for molding disk sound records, a recessed die plate, a matrix located in the recess of said plate, the thickness of said matrix being less than the depth of said recess, a second die plate having a disk-like projection with vertical walls adapted to telescope with said recess, one of said die plates being provided with a centering opening, and a pin or projection located on the other of said die plates and adapted to cooperate with the said centering opening in the first mentioned die plate, to form a centering hole in the record blank.

3. In apparatus for stamping up sound records, the combination of a matrix, a die-plate recessed to contain the matrix and a record blank, said die-plate being provided with a pin projecting through a central aperture of the matrix, and a cooperating die-plate having a central aperture to receive the projecting end of said pin, such aperture being enlarged at its upper end.

4. An apparatus for molding sound records, comprising a die plate, having a cylindrical recess therein, surrounded by an annular channel, the said channel having outlets at one or more of the sides of the die plate, in combination with a second die plate, having a plunger, telescoping the said recess.

5. An apparatus for molding sound records comprising a die plate having a cylindrical recess therein surrounded by an annular channel, the said channel having outlets at one or more sides of the die plate, in combination with a second die plate, covering said channel and outlets, and having a plunger telescoping said recess, the last mentioned die plate having its inner face cut away to form with the said outlet an enlarged outlet.

6. An apparatus for molding sound records, comprising a die plate having a cylindrical recess therein and an annular depression around said recess, in combination with a second die plate having a plunger telescoping said recess, leaving an annular passage of uniform cross-sectional area around said plunger for the escape of surplus material.

7. An apparatus for molding sound rec-

ords, comprising a die plate having a cylindrical recess therein and an annular depression around said recess in combination with a second die plate covering said depression
5 and having its face cut away to form an outlet therefrom and a plunger projecting from said last mentioned plate telescoping said recess, leaving an annular passage of uniform

cross-sectional area around said plunger for the escape of surplus material.

Signed at New York, N. Y. this 4th day of June 1903.

10

GEORGE K. CHENEY.

Witnesses:

J. E. PEARSON,

W. H. PUMPHREY.

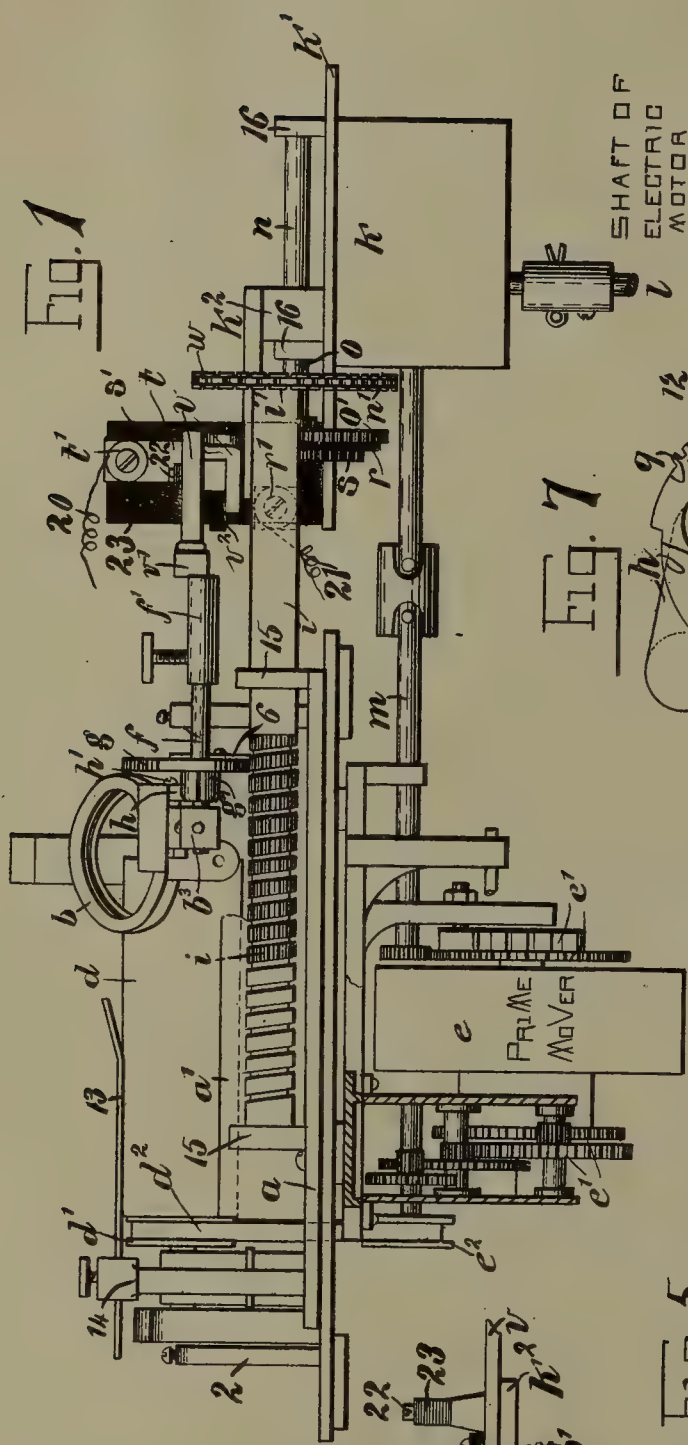


FIG. 1

SHAFT OF
ELECTRIC
MOTOR

FIG. 7

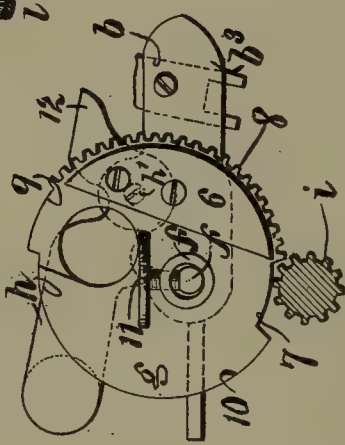


FIG. 5

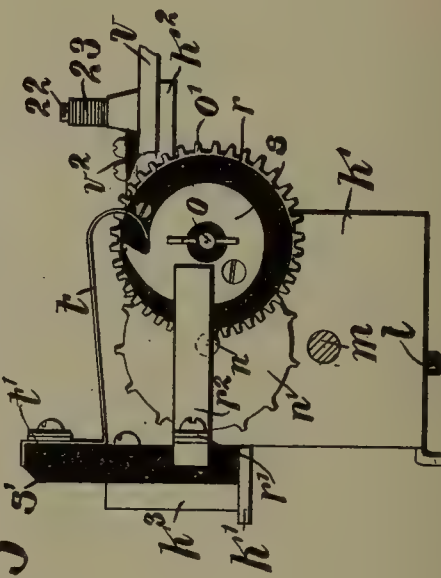
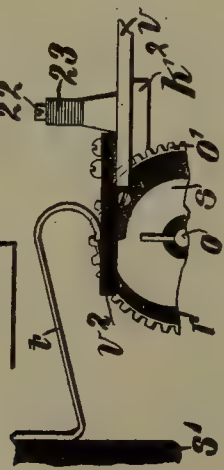


FIG. 6



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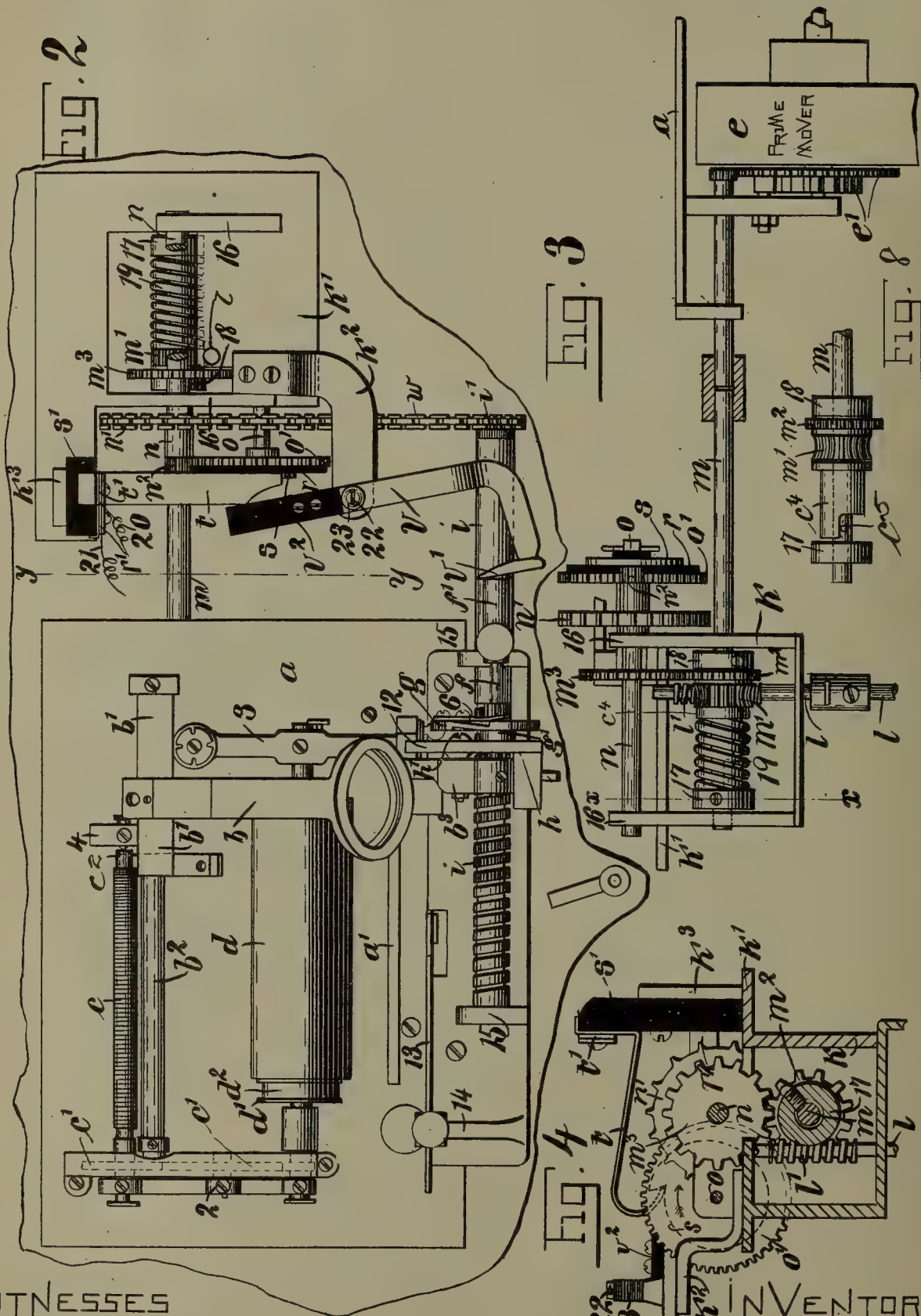
No. 879,589.

W. W. ROSENFELD.
PHONOGRAPH.

APPLICATION FILED AUG. 5, 1904.

PATENTED FEB. 18, 1908.

2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

WILLIAM W. ROSENFELD, OF NEW YORK, N. Y.

PHONOGRAPH.

No. 879,589.

Specification of Letters Patent.

Patented Feb. 18, 1908.

Application filed August 5, 1904. Serial No. 219,599.

To all whom it may concern:

Be it known that I, WILLIAM W. ROSENFELD, a citizen of the United States, residing in the borough of Manhattan, in the city, county, and State of New York, have invented an Improvement in Phonographs, of which the following is a specification.

This invention relates to automatically operated phonographs.

The invention has been made especially with the idea of adapting a spring motor actuated phonograph to operate to make successive productions of a record or records. To this end I provide means for automatically re-winding the motor by which the phonograph is given its reproducing movements, and means for automatically raising the reproducer from the record and for returning the parts to normal or starting position. For re-winding the spring motor, I preferably provide an electric motor and means whereby the circuit is closed to such electric motor to cause the re-winding of the spring motor preferably after the reproduction of a record, and the electric motor also preferably actuates the automatic return mechanism.

Phonographs operated by spring motors are now in common use, but other forms of stored power motors might be employed for directly actuating phonographs for their reproducing movements, and this invention, so far as it relates to the feature of automatically re-winding or otherwise storing power in an actuating motor of a phonograph, considered broadly, is not to be limited to any particular form of such motor.

In the drawings Figure 1 is an elevation and Fig. 2 a plan representing a spring motor actuated phonograph of well known form provided with rewinding and return mechanism in accordance with my present invention. Fig. 3 is an elevation of parts of the operating mechanism looking from the back of Figs. 1 and 2. Fig. 4 is a transverse section and elevation at the dotted line x, x , of Fig. 3. Fig. 5 is an elevation and partial section on dotted line y, y of Fig. 2 looking toward the right. Fig. 6 is an elevation representing some of the parts shown in Fig. 5, but in a different position. Fig. 7 is an elevation in larger size of the eccentric disk and the parts associated therewith looking toward the left in Figs. 1 and 2; and Fig. 8 is an elevation of the friction coupling interposed between the shafts of the electric motor

and the motor for directly operating the phonograph with the friction spring omitted.

As shown in Figs. 1 and 2, a represents the bed of the phonograph; a' the support rail for the free end of the reproducer-arm b which is carried by a sleeve b' movable on a guide-bar b^2 . c represents the feed-screw, and c^2 the feed nut carried by the sleeve b' and engaging the underside of the feed screw for causing the reproducing movement of the reproducer-arm; d represents the mandrel; c' gears within a case or housing connecting the shaft of the mandrel d with the shaft of the feed-screw c , and 2, 3, 4 are bearings for the respective ends of the shaft of the mandrel and feed-screw. d' is a pulley on the mandrel shaft and d^2 a belt around the same and which extends down through the bed a to a pulley e^2 upon a shaft of the train of gears e' of a spring motor e , by which the mandrel is rotated and the reproducer-arm moved for the reproduction of a record. These parts are of usual and well known construction, and do not require further description.

Secured to the reproducer-arm b (see especially Fig. 7) is a bracket-arm b^3 which carries an arbor f upon which an eccentric disk g is revoluble. The arbor f also supports an adjustable sleeve f' clamped thereto by the set-screw shown in Figs. 1, 2 and 7, the office of which sleeve will be hereinafter described.

The eccentric or cam disk g is provided with a notched hub g' , and has secured to its face a weight-plate 6, and its periphery is formed with a notch or low portion 7, with a toothed portion 8 beyond the low portion 7 and extending to a high portion, with a tail-rib 9 beyond the toothed portion, and with a portion 10 which is smooth. Pivotally connected to the bracket-arm b^3 is a latch h having a tooth 11 for engaging the notch in the hub g' , said latch h being weighted or over-balanced by reason of the position of its pivot h' so that its tooth 11 normally bears against the hub g' . Said arm also has an end 12 on the other side of the pivot from the tooth 11 for engaging a cam rod or arm 13 adjustable longitudinally on a support 14 secured to the bed a of the phonograph.

A return feed screw i is mounted in bearings 15 upon the bed of the phonograph. This screw shaft preferably has a spiral groove of coarse pitch compared with the

thread of the feed screw *c* and is provided with teeth between the convolutions of the groove for a portion of its length. The shaft of the return feed screw carries fast thereon a sprocket *i'*.

l represents the shaft from an electric motor, positioned vertically, and having at its upper end a worm *l'* meshing with a gear *m'* mounted free to rotate upon a shaft *m* extending horizontally and having bearings in the sides of a casing *k*. The gear *m'* is formed with a gear *m²*, and these together are loose upon the shaft *m*. The shaft *m* is driven by the rotation of the gear *m'* through a slip coupling which will permit the gear to slip on the shaft when a certain resistance is offered to the rotation of the shaft. Any suitable form of friction coupling, or driving device, may be provided for this purpose. In the preferred form of friction coupling shown, a collar 18 is mounted fast on the shaft *m* at one side of the gears *m'* and *m²*, and at the other side of said gears is a collar 17 also fast on the shaft, while between the collar 17 and the gears is a notched flanged sleeve *c⁴* held against rotation relatively to the shaft *m* by a pin *c⁵* passing through the shaft and pressed against the face of the gear *m'* by a helical spring 19 one end of which bears against the collar 17 and the other end against the flange of the sleeve *c⁴*. (Figs. 3 and 8). The shaft *m* is continued by means of a coupling shown in Figs. 1 and 3, and terminates in a pinion meshing with a gear through which the spring motor *e* may be rewound.

A shaft *n* is mounted above the shaft *m* in bearings 16. Fast on this shaft is a gear *m³* meshing with the gear *m²*; also fast on this shaft *n* is a sprocket *n'*, a chain *w* passing around the sprocket *n'* and to and around the sprocket *i'* on the shaft of the return feed screw for rotating said shaft. The shaft *n* also has fast thereon a pinion *n²* meshing with a gear *o'* mounted upon an arbor *o* which is secured in a lug of the casing *k*. A cam disk *s* of conducting material is mounted to rotate with the gear *o'* and is insulated from the gear *o'* and the arbor *o* by being mounted on an insulating disk *r* secured to the gear *o'*. A spring contact arm *t* for engaging the periphery of the cam disk *s* is secured by a binding-post clamp *t'* to an insulating post *s'* fast to a post *k³* rising from the top plate *k'* of the casing *k*. A contact spring *r²* which constantly bears against the face of the cam disk *s* is also secured by a binding-post clamp *r'* to the insulating-post *s'*. To the binding-post clamps *t'* and *r'* are connected wires 20 and 21 respectively of the circuit to the electric motor, so that in the operation of the machine when the contact arm *t* engages the cam disk *s* the circuit will be closed for operating the motor.

The contact arm *t* is normally held out of

contact with the cam disk *s* by means of a rocker arm *v* pivoted at 22 to a bracket arm *k²*. One end of this rocker arm is provided with an insulating block *v²* adapted to move beneath the contact arm *t* when the latter has been raised by the high point of the cam disk *s*, and the rocker arm is under tension of a spring 23 which tends to swing the rocker-arm on its pivot to move the block *v²* toward and beneath the end of the contact arm. The other end of the rocker arm is provided with a foot piece *v'* which lies in the path of movement of the sleeve *f'* carried by the arbor *f* in position to be engaged thereby as the reproducer arm approaches the end of its reproducing movement.

The position of the parts as shown in Figs. 1 and 2 is that assumed by them at the end of the reproducing movement of the phonograph preparatory to the return of the reproducer arm to an initial or original position either to repeat the record or to reproduce from another record. In these figures the position of the rocker-arm *v* and the spring contact-arm *t* is as represented in Fig. 5, while the position of these parts during the reproduction of the record and before the arbor *f* and its sleeve *f'* reach the limit of their movement is that represented in Fig. 6—that is to say—with the insulating-block *v²* moved beneath and supporting the free end of the spring-arm *t* in which position the electric circuit is broken and the electric motor not running.

As shown in Figs. 1 and 2, the extreme advance movement of the reproducer-arm and arbor *f* have brought the end of the sleeve *f'* in contact with the foot-piece *v'* and the rocker-arm *v* has been thereby swung on its pivot to remove the insulating-block *v²* from beneath the end of the spring-arm *t*, allowing the same to drop into contact with the periphery of the cam-disk *s* so as to complete the electric circuit through the wire 20, binding post clamp *t'*, arm *t*, cam-disk *s*, contact spring *r²*, binding-post clamp *r'* and wire 21, thereby starting the electric motor. The insulating block *v²* is then held against the side of the arm *t* by the action of the spring 23 until the arm *t* is again raised by the cam disk *s* to permit the block *v²* to again move beneath the arm *t*. The electric motor being thus started, the rotation of the shaft *l* and worm wheel *l'* drives the gears *m'*, *m²* together, and the shaft *m* is frictionally driven through the friction coupling formed by the collars 17 and 18, the sleeve *c⁴* and the spring 19, thereby winding up the spring motor *e*. Simultaneously the gear *m²* causes the rotation of the gear *m³* and the shaft *n*, which through the sprocket *n'*, the chain *w* and the sprocket *i'* drives the return feed screw *i*, and the shaft *n* through the pinion *n²* also rotates the gear *o'* and the cam-disk *s*, these parts being so timed and

proportioned that the cam-disk is not given a complete rotation until the return feed screw has been given a rotation more than sufficient to effect the raising of the repro-

5 ducer-arm and its complete return movement and lowering again to its operative position.

When the return feed screw *i* begins to rotate, the teeth thereof engage and mesh with the teeth 8 of the eccentric disk *g* (see Fig. 7) and the disk is thereby rotated to cause successive portions of its toothed cam periphery to engage the return feed screw thereby raising the bracket arm *b*³ and repro-
10 ducer-arm *b* to raise the reproducer from the record and move the feed nut from the feed screw *c* until the teeth 8 have paid out and the tail-rib 9 of this eccentric-disk has settled into the groove of the return feed screw *i*. The tooth 11 of the latch *h* then drops
20 into the notch of the hub *g'* and holds the eccentric disk against further turning, and the disk, the arm *b*³ and the reproducer arm *b* are then by the continued rotation of the return feed screw given a return movement
25 until the end 12 of the latch *h* under-runs the bent end of the arm 13 whereby the end 12 of the latch is pressed down and the tooth 11 withdrawn from the notch in the hub *g'*. The eccentric disk *g* is thereby released and
30 resting on the return feed screw it is turned thereby to bring successive portions of the portion 10 of its cam periphery in engagement with the shaft, whereby the bracket arm *b*³ and the reproducer-arm are gradually
35 lowered until the reproducer is returned to operative position and the feed nut is again in engagement with the feed screw *c*. The turning of the disk *g* will continue until its periphery clears the return feed screw, after
40 which, during any further rotation of the return feed screw and during the next reproducing movement of the reproducer-arm, the disk will be held by the weight 6 in position with its low portions 7 opposite the re-
45 turn feed screw and with the shoulder formed by the first of its teeth 8 bearing against the return feed screw ready to be engaged by the teeth of the return feed screw when the latter is rotated for the next return
50 movement.

The rotation of the return feed screw continues until the end of the contact arm *t* is raised by the cam disk *s* to permit the block *v*² of the rocker arm *v* to move under the end
55 of the contact arm and until the high point of the cam disk has then moved beyond and out of contact with the contact arm, thereby breaking the circuit and stopping the electric motor.

60 To insure the full return movement of the reproducer arm, the amount of rotation given to the return feed screw is preferably, and as before pointed out, more than sufficient to effect the elevation, return and lower-
65 ing of the reproducer arm with the longest

record which the machine is adapted to re-
produce. The return feed screw will thus continue to rotate after the reproducer arm has been returned and lowered; and to pre-
vent the eccentric disk *g*, which then rests 70 with the first of its teeth 8 bearing against the return feed screw, from being turned by such further rotation of the return feed screw, the portion of the return feed screw against which the disk *g* then rests is circum-
75 ferentially smooth, the gear teeth of the return feed screw extending only for a part of the length of the screw from the other end thereof.

If the spring motor *e* is allowed to continue 80 in operation after the return of the reproducer arm and the feed nut to operative position, the phonograph will be again actuated thereby for again reproducing the record, the electric motor meanwhile remain-
85 ing at rest until the reproducer arm nears the end of its reproducing movement, at which time the sleeve *f'* will again engage the foot piece *v'* to swing the rocker arm *v* to carry the block *v*² from under the contact arm *t* and
90 permit the contact arm to spring into contact with the periphery of the cam disk *s*, thereby again closing the circuit for causing the electric motor to operate to rewind the spring motor and to rotate the return feed screw
95 for again returning the reproducer arm to its initial or starting position. Evidently, however, suitable means may be provided for stopping the operation of the spring motor before the return movement of the re-
100 producer arm has been completed, and when such means is provided the entire mechanism will remain at rest after the return movement of the reproducer arm has been
105 completed and until the spring motor is again put in operation, whereupon the reproducing and return movements of the phonograph and the rewinding of the spring motor will again be effected in order and re-
110 peated until the spring motor is again stopped.

By adjustment of the sleeve *f'* and the cam rod 13, the extent of operation of the spring motor before being rewound may be varied, and the mechanism shown may be adapted
115 for records of varying length so that the reproducing devices shall operate only over the length of the actual record, thus avoiding waste of time and unnecessary movement of the parts.

To insure full rewinding of the spring motor with the longest record which the machine is adapted to reproduce, the amount of rotation given to the worm gear *m'* at each operation of the electric motor will
125 preferably be more than sufficient to rewind the spring motor to the tension to which it was wound before the commencement of the reproducing movement, and the friction coupling between the worm gear and the re- 130

winding shaft *m* is provided for the purpose of permitting continued movement of the worm gear after the spring motor has been fully rewound, the resistance to the rotation of the shaft *m* being sufficient to cause the parts of the coupling to slip.

It will be seen that with the construction shown, the return movement of the reciprocating part of the phonograph, that is the reproducer arm in the construction shown, is effected entirely by the power of the electric motor and does not add at all to the work to be performed by and cannot affect the operation of the spring motor.

It will be understood that the invention is not to be limited to the exact construction and arrangement of parts shown in the drawings and to which the foregoing description has been mainly confined, but that it includes changes and modifications thereof within the claims. It will be understood also that features of the invention may be employed independently of other features thereof, and that the invention or features thereof may be applied to other forms of phonographs from that shown.

It will be understood also that the term "phonograph" is used herein as a broad term to include all sound reproducing machines to which the invention is or may be found applicable.

Features of invention disclosed but not claimed herein are claimed in Patent No. 859,114 granted to me on an application filed as a division of this application, and in my pending applications No. 243,612 and No. 385,388.

I claim as my invention

1. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of means for automatically storing power in said motor in the interval between successive reproductions of a record or records, substantially as described.

2. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of means controlled by the movement of a part of the phonograph for automatically storing power in said motor, substantially as described.

3. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of a second motor, and means controlled by the movement of a part of the phonograph to cause power to be stored in the first motor by the operation of the second motor, substantially as described.

4. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of a second motor for storing power in the first motor, and automatically operated means for causing the second motor to operate in the interval between successive reproductions of a record or records, substantially as described.

5. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of a second motor for storing power in the first motor, and means controlled by the movement of a part of the phonograph for causing the second motor to operate in the interval between successive reproductions of a record or records, substantially as described.

6. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of a second motor and automatically operated means for causing power to be stored in the first motor by the operation of the second motor after the reproduction of a record, substantially as described.

7. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of a second motor for storing power in the first motor, means controlled by the movement of a part of the phonograph for causing the second motor to operate after the reproduction of a record, and adjustable means for varying the time at which the second motor is caused to operate with relation to the operation of the phonograph, substantially as described.

8. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of a second motor, and connections between the second motor and the first motor for storing power in the first motor by the operation of the second motor, said connections including means for permitting a slipping of the parts after the desired tension has been applied to the first motor, substantially as described.

9. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of a second motor, and connections between the second motor and the first motor for storing power in the first motor by the operation of the second motor, said connections including a friction driving device, substantially as described.

10. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of a second motor, connections between the second motor and the first motor for storing power in the first motor by the operation of the second motor, said connections including a friction driving device, and means for starting the second motor and for automatically stopping it after an operation more than sufficient to restore to the first motor the power exerted by the first motor in actuating the phonograph for the reproduction of a record, substantially as described.

11. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of an electric motor, and automatically operated means for causing power to be stored in the first motor by

the operation of the electric motor in the interval between successive reproductions of a record or records, substantially as described.

12. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of an electric motor, and means controlled by the movement of a part of the phonograph to cause power to be stored in the first motor by the operation of the electric motor, substantially as described.

13. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of an electric motor, connections for storing power in the first motor by the operation of the electric motor, and means for automatically closing the circuit to the electric motor after the reproduction of a record, substantially as described.

14. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of an electric motor, connections for storing power in the first motor by the operation of the electric motor, means for automatically closing the circuit to the electric motor after the reproduction of a record, and adjustable means for varying the time of closing the circuit with relation to the operation of the phonograph, substantially as described.

15. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of an electric motor, connections for storing power in the first motor by the operation of the electric motor, and means controlled by the movement of a part of the phonograph for closing the circuit to said motor, substantially as described.

16. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of an electric motor, connections for storing power in the first motor by the operation of the electric motor, means for closing the circuit to the electric motor, and means for automatically opening said circuit after a predetermined operation, substantially as described.

17. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of an electric motor, connections for storing power in the first motor by the operation of the electric motor, means controlled by the movement of a part of the phonograph for closing the circuit to said electric motor, and means for opening said circuit after the shaft of the electric motor has made a predetermined number of revolutions, substantially as described.

18. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of an electric motor, connections between the electric motor and the first motor for storing power in the first motor by the operation of the electric motor, said connections including means for permitting a slipping of the parts after the desired

tension has been applied to the first motor, automatically operating means for closing the circuit to the electric motor, and means for opening said circuit after the shaft of the electric motor has made a number of revolutions greater than is required to store power in the first motor, substantially as described.

19. The combination with a phonograph and a spring motor for actuating the phonograph in reproducing a record, of an electric motor, connections between the electric motor and the spring motor for rewinding the spring motor, said connections including means for permitting a slipping of the parts after the desired tension has been applied to the first motor, means for closing the circuit to the electric motor after the reproduction of a record, adjustable means for varying the time of operation of the circuit closing means for records of different lengths, and means for opening said circuit after the shaft of the electric motor has made a predetermined number of revolutions not dependent on the operation of the spring motor, substantially as described.

20. The combination with a phonograph and a spring motor for actuating the phonograph in reproducing a record, of an electric motor, and automatically operated means for causing the spring motor to be rewound by the electric motor after the reproduction of a record, substantially as described.

21. The combination with a phonograph and a spring motor for actuating the phonograph in reproducing a record, of an electric motor, connections between the electric motor and the spring motor for rewinding the spring motor, and means controlled by the movement of a part of the phonograph for closing the circuit of the electric motor, substantially as described.

22. The combination with a phonograph and a spring motor for actuating the phonograph in reproducing a record, of an electric motor, connections between the electric motor and the spring motor for rewinding the spring motor, means controlled by the movement of a part of the phonograph for closing the circuit to the electric motor after the reproduction of a record, and adjustable means for varying the time of closing the circuit with relation to the operation of the phonograph, substantially as described.

23. The combination with a phonograph having a reciprocating reproducer carrier and with a spring motor for actuating the phonograph in reproducing a record, of an electric motor and the spring motor for rewinding the spring motor, and means controlled by the movement of the reproducer carrier for closing the circuit to the electric motor, substantially as described.

24. The combination with a phonograph and a spring motor for actuating the phono-

graph in reproducing a record, of means controlled by the movement of a part of the phonograph for rewinding the spring motor, substantially as described.

5 25. The combination with a phonograph and a spring motor for actuating the phonograph in reproducing a record, of a second motor and connections for rewinding the spring motor, and means controlled by the
10 movement of a part of the phonograph for causing the second motor to operate after the reproduction of a record, substantially as described.

26. The combination with a phonograph
15 and a spring motor for actuating the phonograph in reproducing a record, of a second motor, connections between the second motor and the spring motor for rewinding the spring motor, said connections including
20 means for permitting a slipping of the parts after the desired tension has been applied to the spring motor, substantially as described.

27. The combination with a phonograph and a spring motor for actuating the phonograph in reproducing a record, of a second
25 motor, connections between the second motor and the spring motor for rewinding the spring motor, said connections including a friction driving device, substantially as described.

30 28. The combination with a phonograph having a reciprocating reproducer carrier and with a motor for actuating the phonograph in reproducing a record, of a second motor for storing power in the first motor, and
35 means controlled by the movement of the reproducer carrier for causing the second motor to operate after the reproduction of a record, substantially as described.

29. The combination with a phonograph
40 having a reciprocating reproducer carrier and with a motor for actuating the phonograph in reproducing a record, of an electric motor, connections for storing power in the first motor by the operation of the electric motor,
45 and means for closing the circuit to the electric motor when the reproducer carrier of the phonograph has reached a certain point in its reproducing movement, and adjustable means for determining the point in the repro-
50 ducing movement of the reproducer carrier at which the circuit to the electric motor shall be closed, substantially as described.

30. The combination with a phonograph and a motor for actuating the phonograph in reproducing a record, of an electric motor, 55 connections for storing power in the first motor by the operation of the electric motor, a circuit closing device for closing the circuit to the electric motor, a member adapted to be moved by the movement of the repro- 60 ducer carrier of the phonograph as it approaches the end of its reproducing movement for causing the circuit to be closed by said circuit closing device, and means operated by the electric motor for causing the 65 circuit to be opened by said circuit closing device, substantially as described.

31. The combination with a phonograph having a reciprocating reproducer carrier and with a motor for actuating the phonograph 70 in reproducing a record, of an electric motor, connections between the electric motor and the first motor for storing power in the first motor by the operation of the electric motor, a cam disk of conducting material turned by 75 the electric motor, a spring contact arm bearing against the cam portion of said disk, a contact device bearing against another portion of said disk, circuit connections with said contact arm and contact device for com- 80 pleting the circuit to the electric motor through said disk, a spring latch for entering beneath the contact arm when the latter has been raised by the cam disk, and means controlled by the movement of the reproducer 85 carrier for moving said latch to release the contact arm, substantially as described.

32. The combination with a phonograph having a record and a reproducer carrier mounted to travel across the record in the 90 reproducing operation and to be raised from the record and returned to its starting point, and a spring motor for actuating the phonograph during the reproducing operation, of automatic means operating in the intervals 95 between the reproducing operations to rewind the said motor and return said reproducer carrier to its starting position.

Signed by me this 26 day of July 1904.

WM. W. ROSENFELD.

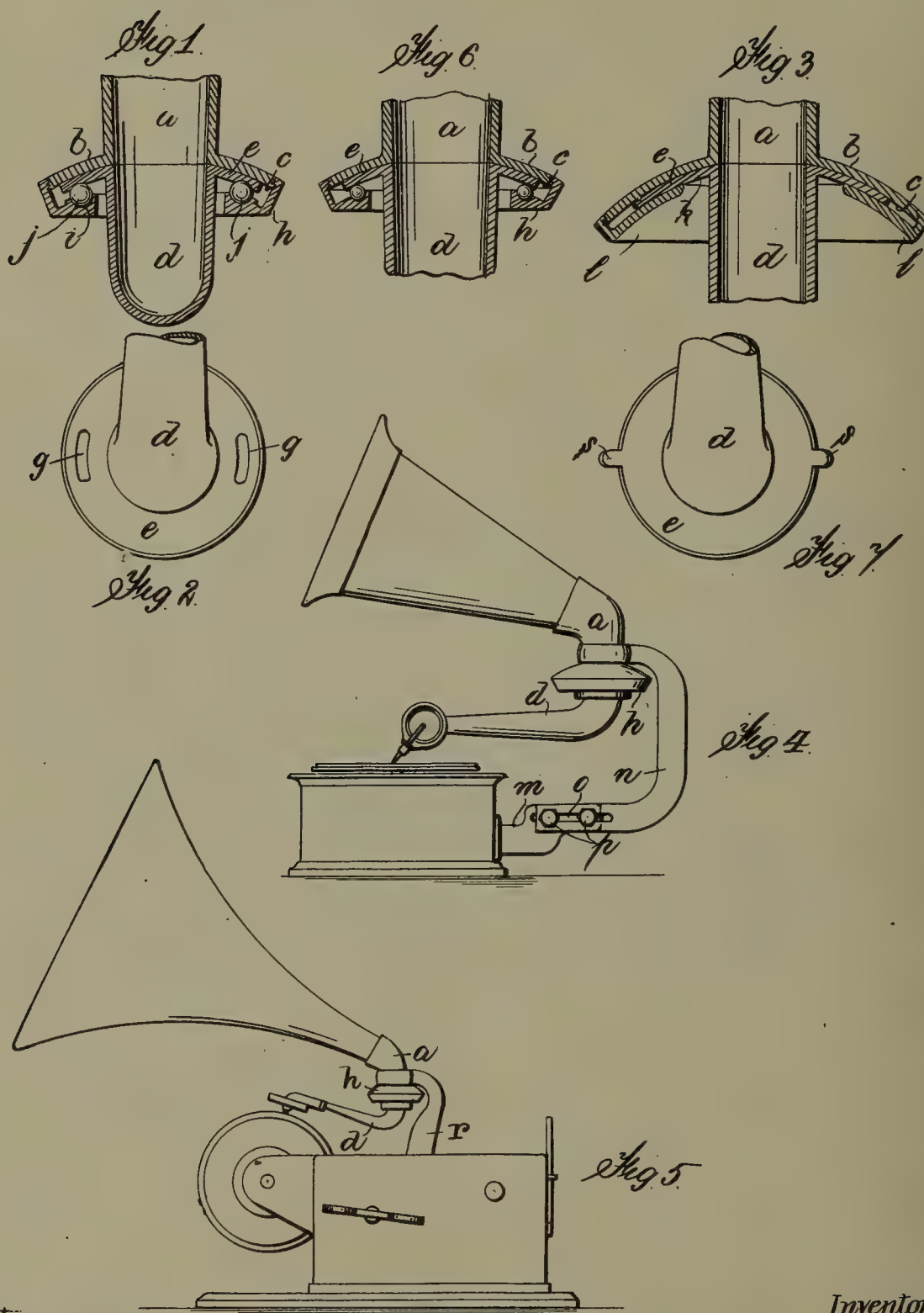
Witnesses:

GEO. T. PINCKNEY,
S. T. HAVILAND.

No. 879,755.

PATENTED FEB. 18, 1908.

A. FISCHER.
TALKING MACHINE.
APPLICATION FILED DEC. 29, 1906.



Witnesses.
Mr. Map. Durrall.
Stephen Kinsto

Inventor:
Alex. Fischer.
by William & Fisher
his Attorneys.

UNITED STATES PATENT OFFICE.

ALEX FISCHER, OF LONDON, ENGLAND.

TALKING-MACHINE.

No. 879,755.

Specification of Letters Patent.

Patented Feb. 18, 1908.

Application filed December 29, 1906. Serial No. 350,014.

To all whom it may concern:

Be it known that I, ALEX FISCHER, a subject of the King of England, residing at 18 Hazlitt road, Kensington, in the county of London, England, have invented certain new and useful Improvements in or Relating to Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in talking machines, and the object of my invention is to make a tight, flexible and universal joint between the tone-arm and trumpet.

The existing tone arms of talking machines having only a horizontal and vertical movement on pivots cannot follow the grooves throughout, the movement thus obtained being an angular one along the curves of the grooves it follows that the stylus (needle) can only touch the grooves at certain points.

Joints constructed as hereafter described will allow the movable part of the joint (tone arm) to move in any direction, that is, up and down and to any oblique angle and thus the sound box stylus will travel in the grooves without jerks, not missing any indentations and producing a sustained rich tone of fine quality and shading.

According to this invention, at one end of the two pipes to be connected, I form or fix an annular flange of spherical curvature so that it forms a concave seating. On the other pipe I also form or fix an annular flange of spherical curvature so that it forms a convex flange which fits exactly against the concave seating of the other pipe. The concave seating is of larger spherical section than the convex flange. The under portion of the convex flange is concentric with the top part of the flange and with the faces of the concave seating, the three spherical surfaces having one common center.

Suitable means are provided for keeping the convex and concave surfaces of the flanges in close contact in all positions into which the joint can move. And in order that this invention may be understood I will proceed to describe the same with reference to the drawings accompanying this specification, in which:—

Figure 1 shows in vertical section the joint between the tone-arm and trumpet of a

talking machine. Fig. 2 is a detail thereof. Fig. 3 shows a form of the invention in which the motion is universal; Fig. 4 shows elevation of a disk phonograph fitted with my improved tone arm; Fig. 5 shows elevation of one means of fitting my improved tone arm to a cylinder phonograph; Fig. 6 shows another form of my joint as being also suitable for a tone arm of talking machines; Fig. 7 shows a construction similar to Fig. 2 with the addition of lugs hereinafter referred to.

The same letters of reference are employed to denote the same parts in all the views.

a is a pipe terminating in the usual trumpet. *b* is an annular flange formed with or attached to the pipe *a* and provided with a spherical concave surface *c* forming the seating. *d* is another pipe, which is provided with a flange *e*. This flange has a convex surface which is of similar spherical curvature to the surface *c* of the flange *b* and fits closely in contact therewith. The flange *e* is provided at the back with two short grooves *g* as shown in the plan of the back of this flange at Fig. 2 to prevent motion of the arm in the plane of the paper. *h* is a ring furnished with an annular groove *i*, or it is obvious that I may have the annular groove *i* on the under side of the flange *e* and the two short grooves *g* on the ring *h*. The ring *h* may be attached to the flange *b* by screwing or otherwise. *j* are balls resting in the grooves *g* and the annular groove *i*. It will be seen that by this arrangement the arm can have a motion of complete rotation given to it and every motion except one in the plane of the paper. In using this joint for disk or cylinder talking machines I may fix to such joint either a taper tubular arm or a parallel tubular arm or a tubular arm partially tapered and partially parallel, to form what is known in the trade as the tone arm.

Fig. 3 shows a form of the invention in which the motion is universal and not restricted in any direction. In this case, the construction is precisely similar to that shown in Fig. 1, but the surface *k* at the back of the flange *e* on the pipe *d* is also spherical but without the grooves *g* and concentric with the surfaces *b* and *e*. It can be kept in position by the spherical surface of the ring *l* (which has no groove *e*) or by other means and attached to the flange *b* by means of screws or otherwise. If desired the side motion in the plane of the paper can also be prevented by fixing two lugs opposite to one

another on the edge of the flange *e* as shown in Fig. 7.

m shows the bracket attached to the casing of the machine which I prefer to fit so as to be capable of horizontal adjustment as shown. This I may effect by having the arm portion *n* of the bracket *m* provided with a slot *o* through which two bolts *p* may pass provided with suitable nuts, so that this portion *n* can be adjusted nearer to or further from the case of the phonograph as may be found necessary.

With reference to Fig. 5 *r* shows a bracket fitted to or formed with the traverse carriage. To the upper end of this bracket *r* is fitted the ring *h* carrying the pipe or tone arm *d*, in the upper portion of which is fixed the trumpet as shown in Figs. 4 and 5.

What I claim and desire to secure by Letters Patent of the United States of America is:—

1. In a talking machine, the combination of a tone arm having a flange at its extreme end, a trumpet having a corresponding flange at its extreme end, and a cap extending from one flange around the end of the other flange and supporting it on the opposite side, but leaving an intermediate space for free movement, substantially as described.

2. In a talking machine, the combination of a tone arm having a convex annular flange at its extreme end, a trumpet having a similarly shaped, but concave, annular flange at its extreme end and adapted to fit over said first named flange, a cap fastened to and extending from one flange around the edge of the other flange and supporting it on the opposite side, but leaving an intermediate space for free movement, substantially as described.

3. In a talking machine, the combination of a tone arm having an annular convex flange at its extreme end, a trumpet having a similarly shaped but concave annular flange at its extreme end, and adapted to fit against said first named flange, a cap fastened to and extending from one of said flanges around the edge of the other flange and supporting it on the opposite side, but leaving an intermediate space for free motion, and anti-friction devices between said cap and one of said flanges, substantially as described.

In testimony whereof, I affix my signature, in presence of two witnesses.

ALEX FISCHER.

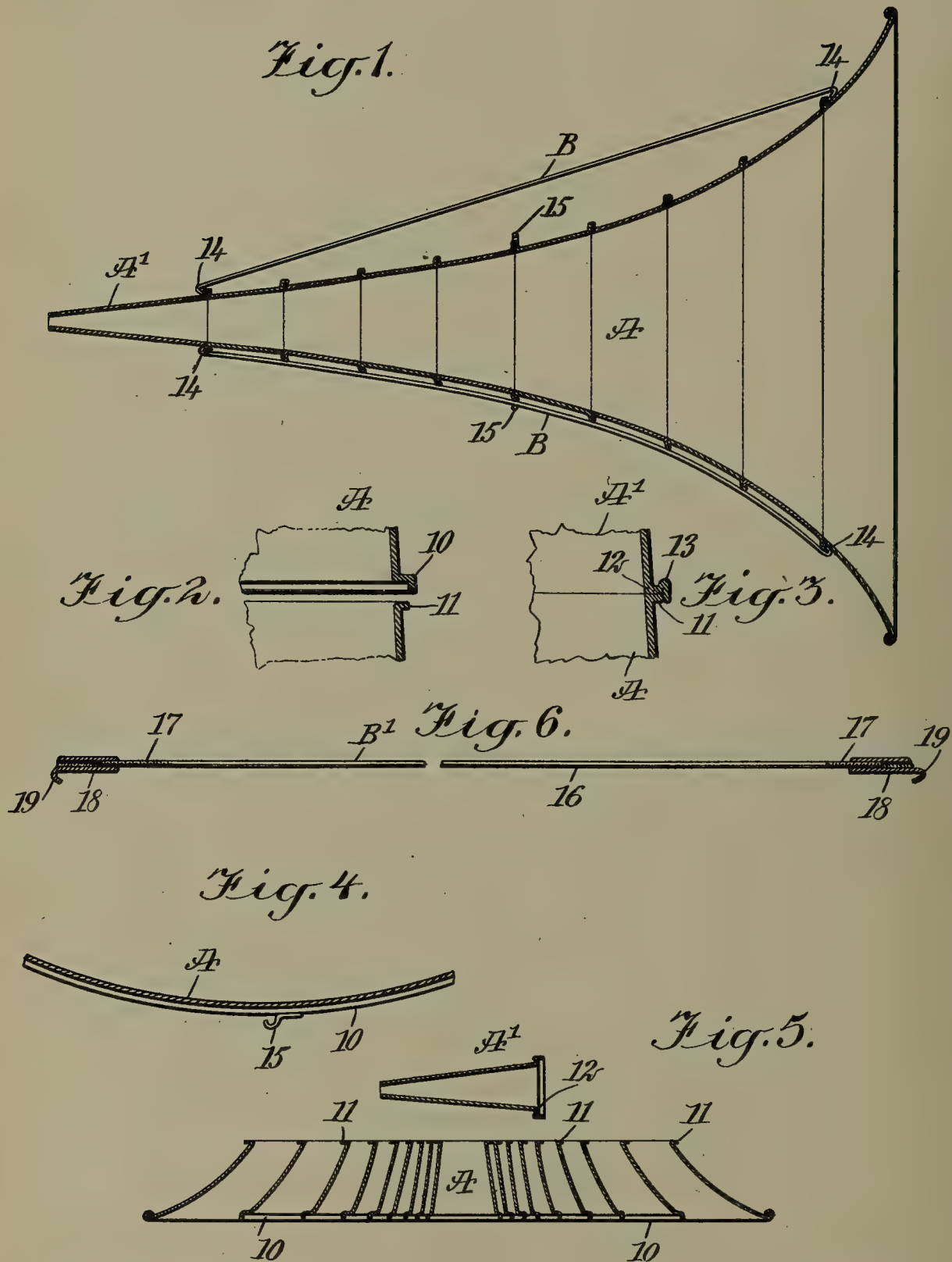
Witnesses:

A. BROWNE,
H. D. JAMESON.

No. 879,797.

PATENTED FEB. 18, 1908.

V. H. RAPKE.
PHONOGRAPH HORN.
APPLICATION FILED JUNE 15, 1907.



WITNESSES

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VICTOR H. RAPKE, OF NEW YORK, N. Y.

PHONOGRAPH-HORN.

No. 879,797.

Specification of Letters Patent.

Patented Feb. 18, 1908.

Application filed June 15, 1907. Serial No. 379,119.

To all whom it may concern:

Be it known that I, VICTOR H. RAPKE, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and useful Improvement in Phonograph-Horns, of which the following is a full, clear, and exact description.

10 The purpose of the invention is to provide a collapsible phonograph horn or megaphone, wherein the sections can be completely separated one from the other, and compactly nested, and to provide simple means for
15 drawing the sections together, which means can be quickly and conveniently applied or removed.

It is a further purpose of the invention to so construct the horn that the vibrations will
20 not be carried from one section to the other, and whereby the vibrations will be extremely light and will in no manner interfere with the sound waves passing through the horn; and it is also a purpose of the invention to so construct the horn that there will be absolutely
25 no rattling when the horn is set up and in use.

The invention consists in the novel construction and combination of the several
30 parts as will be hereinafter fully set forth and pointed out in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference
35 indicate corresponding parts in all the figures.

Figure 1 is a longitudinal section through the improved horn, showing one tie rod simply fitted thereto and a second tie rod in clamping engagement therewith; Fig. 2 is an
40 enlarged section through portions of opposing body sections of the horn, illustrating the manner in which one section is fitted to the other; Fig. 3 is a view similar to that shown in Fig. 2, but illustrating the form of connection employed between the inner or most
45 contracted body section and the section next thereto; Fig. 4 is an enlarged transverse section through a portion of the horn, illustrating a form of keeper employed for the locking or clamping devices for the body sections of
50 the horn; Fig. 5 is a longitudinal section through the body section of the horn, showing the said body sections nested; and Fig. 6 is a sectional side elevation of one of the tie
55 rods, showing a modified construction.

The horn is made up of sections A, any desired number of sections being employed, and the said sections are usually of the same depth except the most contracted or innermost section that is designated as A'. When
60 the sections or members of the horn are assembled they lie in close engagement one with the other, and while various means may be employed for effecting a connection between opposing sections of the horn, the
65 means shown in detail in Figs. 2 and 3 are those that are preferred. It will be distinctly understood that the sections of the horn in no manner telescope each other, but their opposing edges rest flatly and smoothly
70 one against the other, and in holding the sections of the horn assembled they are drawn together by clamping devices to be hereinafter described.

Each body section A is provided with a
75 hub 10 at one end and an outwardly extending flange 11 at the opposite end, the flange of one section being neatly received in the hub of an opposing section, but a slightly different form of connection is provided between the inner section A' of the horn and
80 the next section thereto, and this connection is illustrated in Fig. 3, and may be used for all the sections and consists in providing an angular flange 12 at the outer edge of the
85 forward end portion of the said section A', against which angular flange 12 the flange 11 of the next section has bearing. The flange 12 of the horn section A' is provided at the junction of its members with an annular rib
90 or bead 13. The fastening device employed consists of two or more, usually three, tie rods B and these tie rods B are made of spring material of suitable gage, and each rod B is provided with a hook 14 at each end, as
95 shown in Fig. 1.

After the sections of the horn have been assembled, one of the hooked ends of the tie rods are made to engage with the connection between the forward section A and the section
100 next thereto, and the opposite ends of the tie rods are made to engage with the flange 12 at the head 13 thereon, as is shown in Fig. 1. The tie rods B are made of such length that when they have been sprung into
105 the position just described, they are tight and will hold the sections of the horn together, but in order that the said sections may be positively drawn and firmly held in engagement one with the other, the tie rods B
110

are sprung inward at their central portions so as to lie against the exterior of the horn conforming to its exterior contour, as is also shown in Fig. 1, and the tie rods are held in this position by passing them beneath keepers 15, usually formed on the exterior of one of the sections of the horn, and these keepers 15 are preferably in the form of hooks, as is clearly illustrated in Fig. 4, and where the rods and keepers engage either one or the other may be insulated so as to prevent the rods from vibrating or conducting vibrations from one section to the other.

The tie rods B shown in Fig. 1 are plain, that is to say they are made from one piece of material, but it is sometimes desirable to employ the type of rod B' shown in Fig. 6, wherein the rod is provided with an exterior thread 17 at each end, one thread being a right-hand thread and the other a left-hand thread, the threaded end of a tie rod is received in a correspondingly threaded sleeve 18, and each of the said sleeves 18 is provided with a hook 19 at its outer end. The tie rods B' are applied in the same manner as the tie rods B and are also held to the body of the horn by keepers 15, but in the form of the tie rods B' the said rods may be lengthened or shortened to adapt them to horns of different length.

It is evident that a horn of the character described can be quickly and conveniently built up and locked in its set-up position, and that by simply loosening and removing the tie rods employed the sections of the body of the horn will separate and can be nested, as is shown in Fig. 5, and packed in an exceedingly small compass. I desire it to be understood that insulating material may also be employed when the ends of the rods engage the sections of the horn.

Having thus described my invention, I claim as new and desire to secure by Letters Patent,—

1. A phonograph horn or like device, constructed in independent sections, and clamping devices for drawing the sections together and holding them in abutting engagement one with the other.

2. A phonograph horn or like device, constructed in a series of independent sections, separable connections between opposing

edges of the sections, and devices for drawing the sections together in abutting relation.

3. A phonograph horn or like device, constructed in a series of independent abutting sections, separable connections for the sections, and clamping devices in engagement with the exterior portion of the end sections of the horn.

4. A phonograph horn or like device, constructed in a series of independent sections, tie rods in clamping engagement with the exterior faces of the end sections of the horn, and keepers for the said rods carried by an intermediate section of the horn.

5. A phonograph horn or like device, constructed in a series of independent sections, separable connections between opposing sections, tie rods of a spring material having their end portions in clamping engagement with the outer faces of the end sections of the horn, and keepers secured to the exterior of an intermediate section of the horn, the said tie rods being sprung beneath the said keepers at points between their ends whereby to have a drawing action on the sections of the horn.

6. The combination with a phonograph horn or like device, constructed in a series of sections, which sections are placed edge to edge, and separable connections between opposing edges of the said sections, of tie rods constructed of a spring material, the said rods having a right-hand thread at one end and a left-hand thread at the opposite end, correspondingly threaded sleeves that receive the threaded ends of the rods, hooks located at the outer end portions of the said sleeves adapted for engagement with the exterior of the horn where the outer sections connect, and with the exterior of the horn where the inner sections connect, and keepers secured in the intermediate section of the horn, beneath which keepers the said tie rods are passed at points between their ends.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

VICTOR H. RAPKE.

Witnesses:

J. FRED ACKER,
JOHN P. DAVIS.

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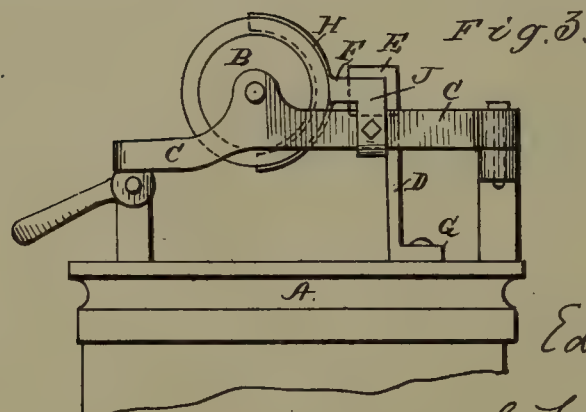
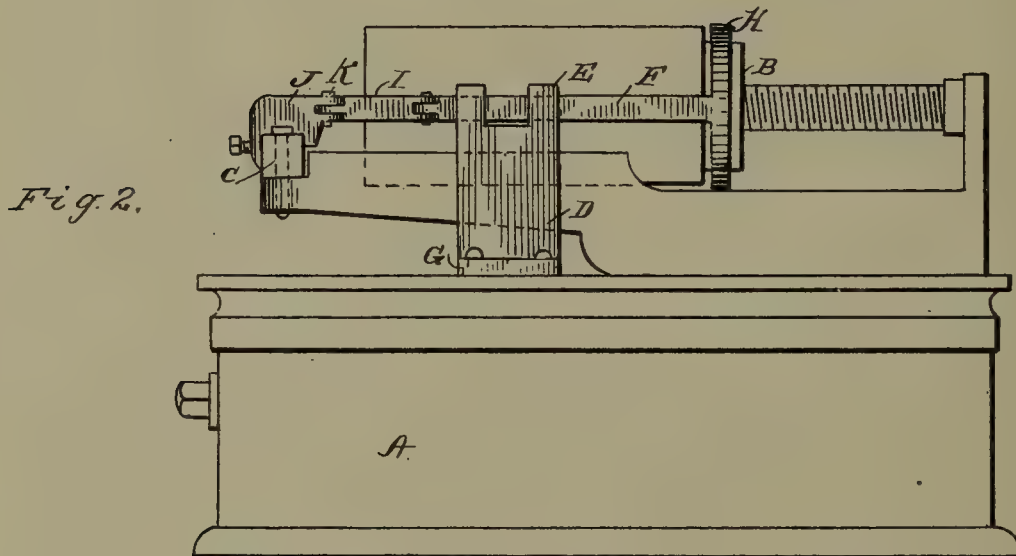
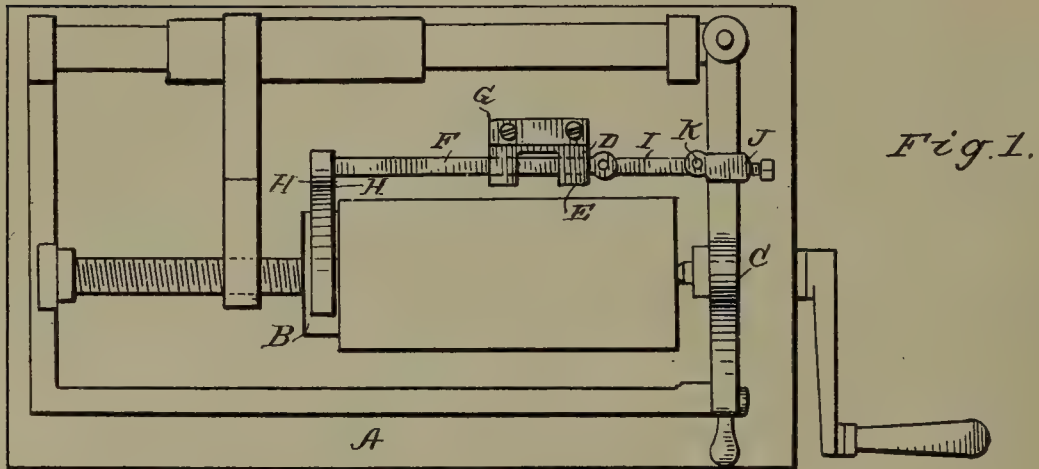
No. 880,016.

PATENTED FEB. 25, 1908.

E. B. DONALDSON.
ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED MAR. 28, 1907.

2 SHEETS—SHEET 1.



Witnesses

R. E. Barkley.
L. A. Sands.

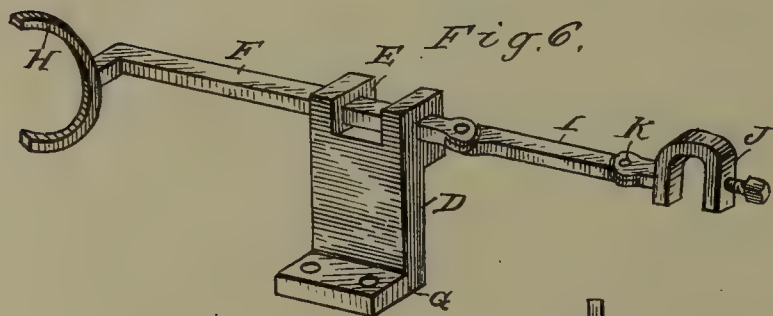
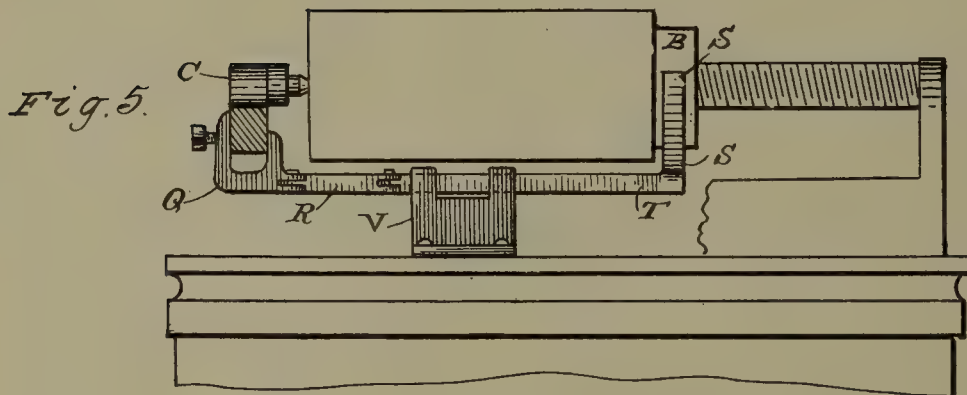
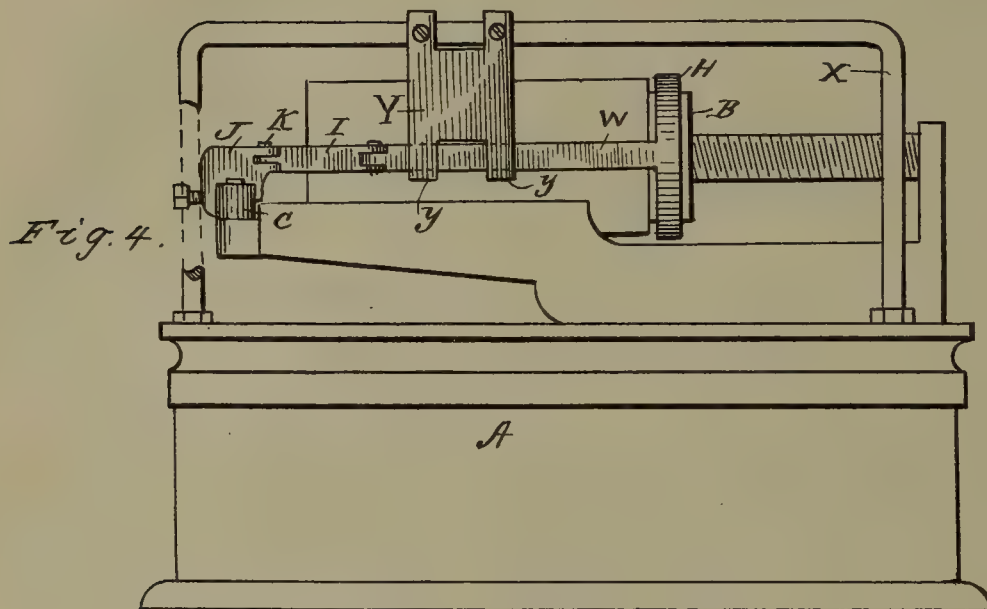
Inventor

Edwin B. Donaldson,
by Frank S. Appleman,
Attorney.

E. B. DONALDSON.
ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED MAR. 28, 1907.

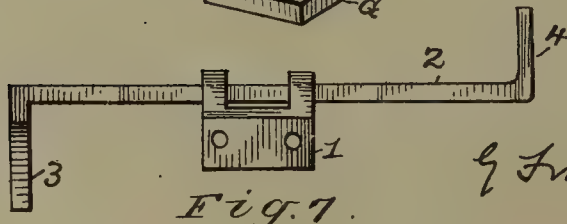
2 SHEETS—SHEET 2.



Inventor

Witnesses

L. E. Barkley
L. A. Sande



Edwin B. Donaldson

by Francis Appleman,

Attorney.

UNITED STATES PATENT OFFICE.

EDWIN B. DONALDSON, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR OF ONE-HALF
TO FREDERICK A. LINGER, OF WASHINGTON, DISTRICT OF COLUMBIA.

ATTACHMENT FOR PHONOGRAPHS.

No. 880,016.

Specification of Letters Patent.

Patented Feb. 25, 1908.

Application filed March 28, 1907. Serial No. 365,074.

To all whom it may concern:

Be it known that I, EDWIN B. DONALDSON, citizen of the United States of America, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Attachments for Phonographs, of which the following is a specification.

This invention relates to phonographs and like instruments in which a cylindrical record is applied to a cylinder.

An object of the invention is to provide means for imparting to the record an initial movement or thrust to disengage the record from the cylinder and project it beyond the end of the cylinder in order that the operator may handle the same by applying his fingers to the internal wall of the cylinder and obviate any damage to the said record which might result from handling the exterior surface.

A further object of this invention is to provide a means for connecting the record actuating device to the end gate of the ordinary phonographs, in order to impart the movement of the said end gate to the actuating mechanism; thus releasing and actuating the record at a single operation.

A still further object of the invention is to provide an attachment of the character noted that can be applied to phonographs now in common use without in any way changing their construction; the said attachment being simply anchored to parts of machines as they are now made.

Finally an object of the invention is to provide a device of the character noted that will possess advantages in points of efficiency and durability, proving at the same time simple in construction and comparatively inexpensive.

With the foregoing and other objects in view, the invention consists in the details of construction and in the arrangement and combination of parts to be hereinafter more fully set forth and described.

In describing the invention in detail, reference will be had to the accompanying drawings, forming part of this specification in which like characters denote corresponding parts in the several views, in which—

Figure 1, is a top plan view of a portion of a phonograph showing the invention applied thereto. Fig. 2, is a view in elevation of the

rear thereof. Fig. 3, is a view in elevation of the end thereof. Fig. 4, is a rear elevation showing a modified construction. Fig. 5, illustrates another modification. Fig. 6, is a perspective view showing the details of construction of the attachment illustrated in Figs. 1 and 2. Fig. 7, is a detail view of a further modification.

In these drawings A, denotes a base of a phonograph, B, a cylinder of ordinary construction and C, the end gate of an ordinary phonograph.

The attachment consists of a standard D, having suitable bearing E, at its end to remove a rod F, which is adapted to slide in said bearing. The standard has a suitable base or foot G, which is clamped or otherwise secured to part of a phonograph. The rear end of the rod F, has two curved arms H, their armed surfaces conforming to the contour of the surface of the cylinder, and being approximately the thickness of a record, although the proportion of the arms is an immaterial detail.

The outer end of the rod has a pivotally connected link I, extending to a point nearly under the retaining lever. A hook J, is attached to the retaining lever by the hook j, embracing said retaining lever and said hook terminates in an angular extension K, to which the outer end of the link I, is pivoted.

In the modification shown in Fig. 4, a phonograph may be provided with a bracket X, or if desired, the rod which usually forms a portion of the phonograph may be utilized as a means for suspending the hanger Y, which hanger terminates in bearings y, in which the rod W, may slide. In this form the remainder of the structure, viz: the rod, record engaging arms, the link and the means for securing the outer end of the link to a hook which engages the end gate of the phonograph are the same as those heretofore described and need not, therefore, be referred to, in detail.

In the modification shown in Fig. 5, the bracket V, is the same as that shown in Figs. 1, and 2, except that it is shorter and is stationed under the record. In this form the rod T, is slidable in bearings of the bracket and the arms S, embrace the cylinder from the bottom, while the link R, has a hooked extension Q, embracing the end

gate from the bottom. The hooks may be secured by the end gate in any convenient manner, but I have shown them in all of the forms as provided with a set screw threaded through the outer member of the hook and adapted to bind against the retaining lever.

In the modification shown in Fig. 7, the bracket 1, is similar in all respects to that heretofore described and the bar 2, is slidable therein having on its ends the arms 3, which are to contact with the record. This modification is designed for use on phonographs not having the end gate and for the purpose of permitting the manipulation of the said rod the outer end thereof has a right angular extension 4 forming a thumb piece, which is engaged by the hand of the operator for reciprocating the rod in its bearings.

What I claim is:

1. An attachment for phonographs consisting of a bar adapted to reciprocate, bearings therefor, curved arms on the end of the bar shaped to the contour of a cylindrical record and adapted to abut the end of the record, an end gate, and means for connecting the bar to the end gate to take movement therefrom.

2. In an attachment for phonographs, a bar adapted to reciprocate with relation to the cylinder of a phonograph, record engaging means carried by the said bar and suitable means for connecting the bar to the end

gate of a phonograph whereby the said bar takes movement from the lever.

3. In an attachment for phonographs, a bar adapted to reciprocate, means for supporting the bar with relation to the record of a phonograph, record engaging members carried by the bar adapted to contact with the inner end of the said record, means for connecting the bar to the end gate of a phonograph whereby the movement of the end gate is communicated to the bar.

4. An attachment for phonographs, having a cylindrical record, consisting of a reciprocating member, a bearing therefor, curved arms on the end of the reciprocating member adapted to conform to the contour of the record and contact the ends thereof, whereby the endwise movement of the record is afforded.

5. An attachment for phonographs having a cylindrical record, consisting of a reciprocating rod, a bearing for the rod, curved arms on the rod adapted to lie back of the end of the record, and means for reciprocating the rod.

In testimony whereof I affix my signature in the presence of two witnesses, this 5th day of March, 1907.

EDWIN B. DONALDSON.

Witnesses:

J. ROSS COLHOUN,
L. A. SANDS.

No. 880,100.

PATENTED FEB. 25, 1908.

J. ROEVER.

CARRIAGE FEED FOR PHONOGRAPH MACHINES.

APPLICATION FILED JUNE 10, 1907.

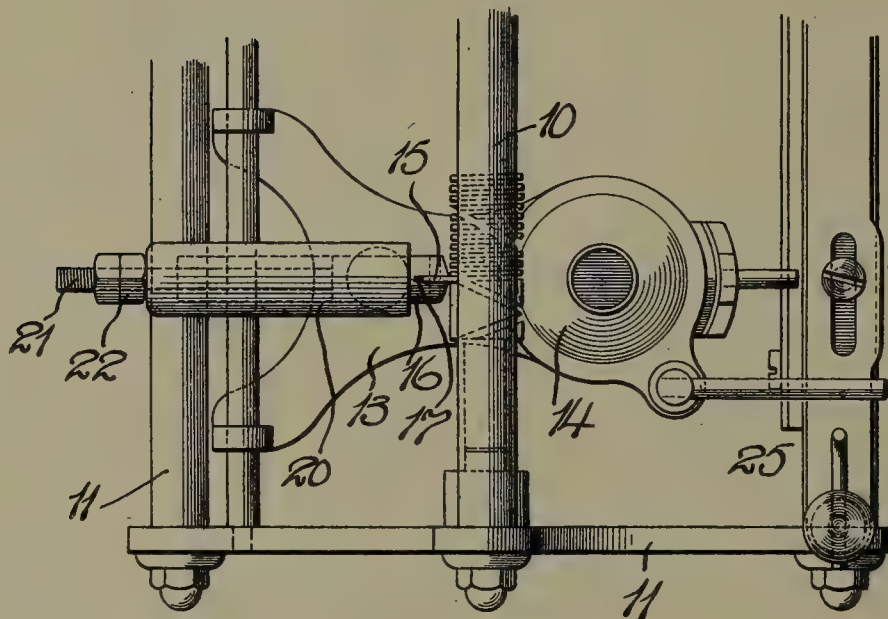


Fig. 1.

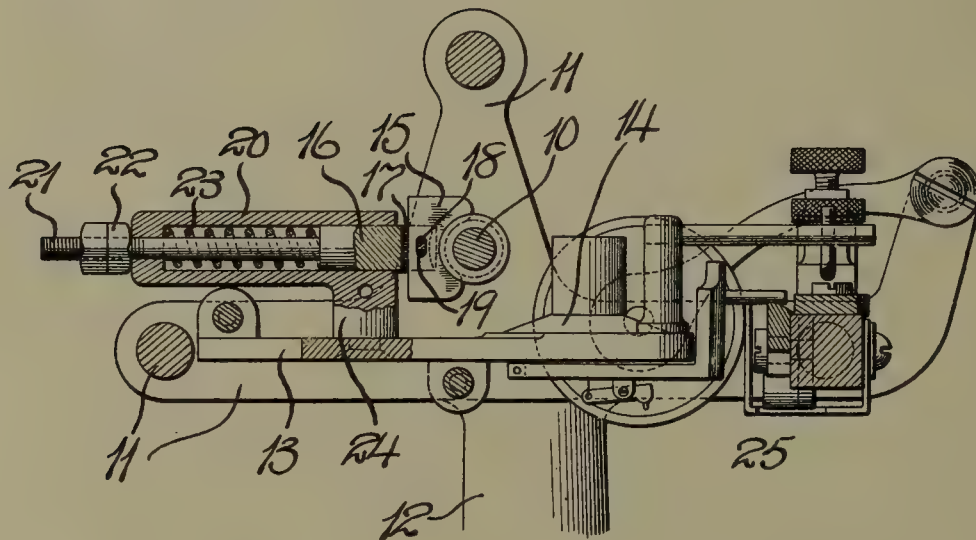


Fig. 2.

WITNESSES:

Ralph Lancaster
Frank L. Hubler.

INVENTOR.
Julius Roever.
BY W. B. Hutchinson.
ATTORNEY.

UNITED STATES PATENT OFFICE.

JULIUS ROEVER, OF NEW YORK, N. Y., ASSIGNOR TO NATIONAL PATENT COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

CARRIAGE-FEED FOR PHONOGRAPH-MACHINES.

No. 880,100.

Specification of Letters Patent.

Patented Feb. 25, 1908.

Application filed June 10, 1907. Serial No. 378,062.

To all whom it may concern:

Be it known that I, JULIUS ROEVER, of the city of New York, county of Kings, and State of New York, have invented a new and useful Improvement in Carriage-Feeds for Phonograph-Machines, of which the following is a full, clear, and exact description.

My invention relates to improvements in phonographs, and especially to that class of phonograph machines in which a feed screw is used for working a reproducer and its carriage backward and forward with relation to a record. In machines of this type, a screw having threads of opposite pitch is used, and a blade is generally arranged to follow the screw and transmit motion to the carriage with which the blade is connected. Heretofore in structures of this kind, there has been a difficulty because of the fact that the blade or its connected mechanisms would some times catch a little, and every little catch or imperfect movement is transmitted to the reproducer, or at least affects the easy movement of the reproducer so that the tone quality of the instrument is injured.

The object of my invention is to remedy this difficulty and produce an attachment which will be sufficiently rigid to cause a positive feed of the reproducer carriage, but which will also be sufficiently elastic and yielding to adapt itself to any slight imperfections of the screw or any imperfect movements of any of the mechanism. In other words, my invention is intended to construct the screw connection of the feed so that it will absolutely follow the thread of the screw at a uniform rate, and without any halts in the movement.

With these ends in view, my invention consists of certain features of construction and combinations of parts which will be hereinafter described and claimed.

Reference is to be had to the accompanying drawing forming a part of this specification, in which similar reference characters indicate corresponding parts in all the views.

Figure 1 is a broken plan view of a phonograph machine provided with my improvements, and Fig. 2 is a sectional elevation thereof with the feed connection shown partly in longitudinal section.

I have shown my improvement in connection with a feed screw 10; which is only shown threaded for a part of the way, but this screw lies parallel with the record of the

machine, which is not here shown, and has threads of opposite pitch. The screw shaft 10 is mounted on a horizontal frame 11, which can be of any approved type, and this is supported on a post 12, and the frame affords a support for the sliding carriage 13, which carries the reproducer 14, and my invention lies in the connection between this carriage 13 and the screw shaft 10. The immediate connection with the screw is by a blade 15, not dissimilar to blades heretofore used on machines of this character, but the blade is yieldingly supported on a plunger 16, the latter being slotted vertically as shown at 17, and the blade is also provided with a slot 18 which receives a pin 19, and thus it will be seen that the blade 15 can move in the slot 17, while it has also a bodily movement with the plunger 16, which latter is held in the casing 20, and is backed by a spring 23, as shown. It will thus be seen that I do not rely merely on the resiliency of the blade 15, which should be of spring material, or even on the resiliency of the blade and spring 23, but I get a flexible movement of the blade with relation to its support, which is also spring pressed and the blade is very sensitive and will follow the thread of the screw at all times.

The plunger 16 has a shank 21 which extends through the outer end of the casing 20, and is screw threaded so as to receive the nuts 22, by means of which the plunger can be adjusted and locked and the tension of the spring 23 regulated. The casing 20 can be connected with the carriage 13 in any convenient way, but I have shown it secured to a post 24 which is fastened to the carriage.

The mechanism shown at 25 at the right hand of the carriage is for regulating the stylus of the reproducer, and has nothing to do with this present invention, therefore it is not described in detail.

It will be seen that the connection between the carriage and the screw is extremely flexible and yet sufficiently positive, and it will be understood that the means for supporting the plunger 16 and connecting it with the carriage, can be varied considerably if desired, without affecting the principle of the invention, though I claim the peculiar support and arrangement of the plunger.

Having thus fully described my invention,

I claim as new and desire to secure by Letters Patent:—

5 1. In a machine of the kind described, the combination with the feed screw and carriage, of a spring pressed support on the carriage, and a blade yieldingly mounted on the support and arranged to connect with the screw.

10 2. The combination with the feed screw and carriage, of a support yieldingly connected with the carriage, and a blade mounted on the support so as to have a limited movement in relation thereto, said blade being arranged also to engage the thread of
15 the screw.

3. The combination with the feed screw

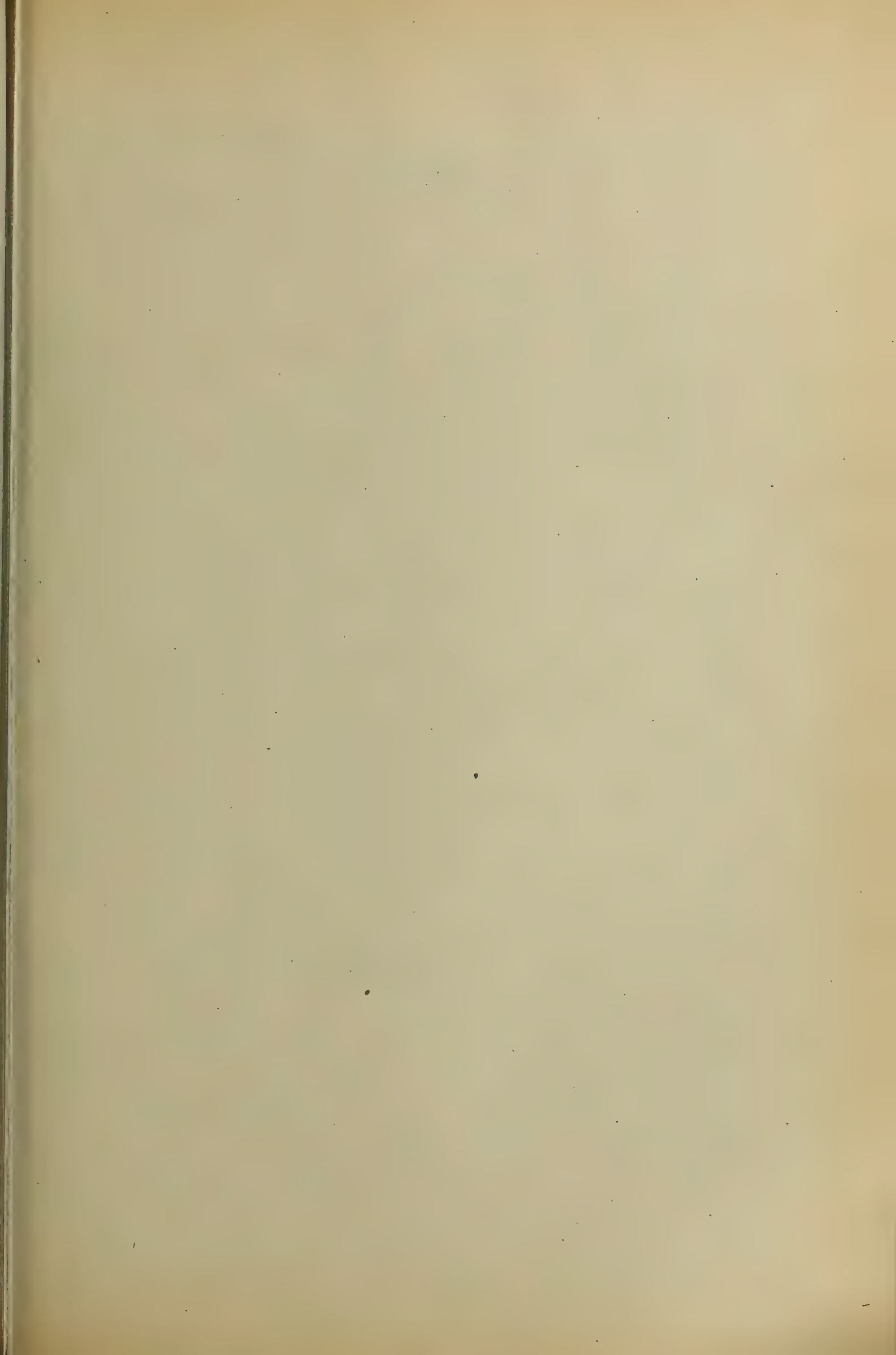
and the carriage, of a slotted support yieldingly mounted on the carriage, and a blade to engage the screw, said blade being mounted in the slot of the support and having a
20 limited movement in the said slot..

4. The combination with the feed screw and the carriage, of a casing, a spring pressed plunger mounted in the casing, and a blade supported on the plunger so as to
25 have a limited movement in relation thereto, said blade being also arranged to engage the screw.

JULIUS ROEVER.

Witnesses:

WARREN P. HUTCHINSON,
FRANK L. STUBBS



No. 880,320.

PATENTED FEB. 25, 1908.

A. C. MESTRAUD.
REPRODUCER FOR PHONOGRAPHS.

APPLICATION FILED JUNE 18, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

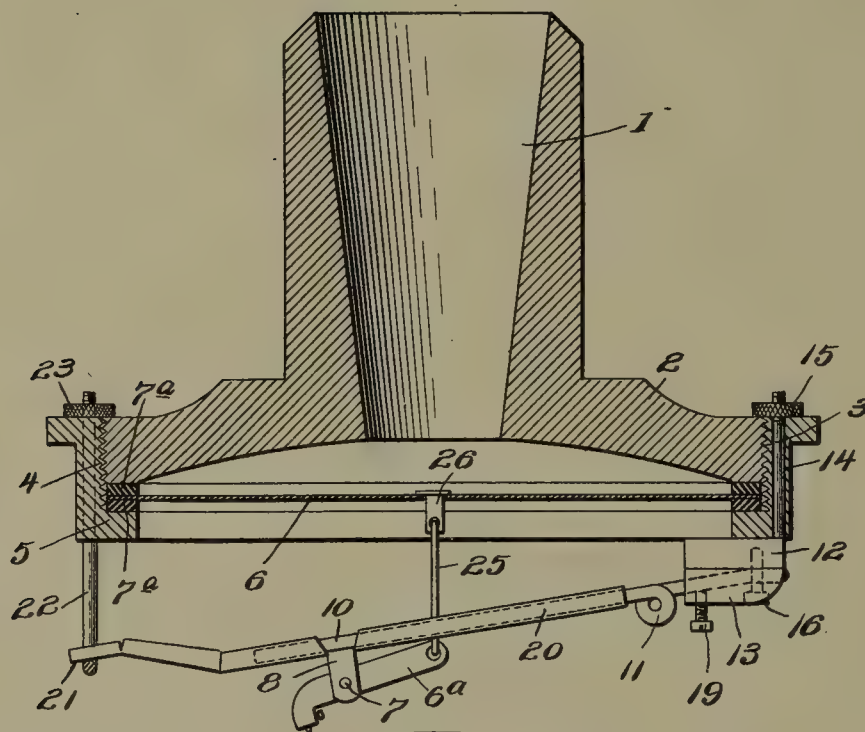
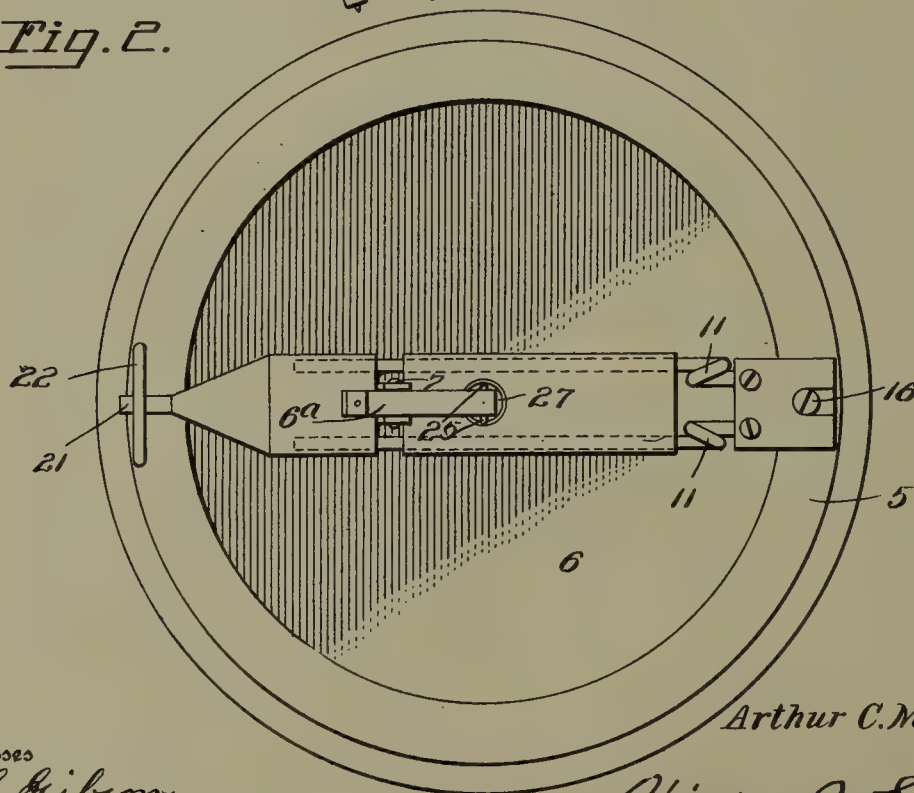


Fig. 2.



Inventor

Arthur C. Mestraud.

Witnesses

F. C. Gibson.

By

Victor J. Evans

Attorney

A. C. MESTRAUD.
REPRODUCER FOR PHONOGRAPHS.
APPLICATION FILED JUNE 18, 1907.

2 SHEETS—SHEET 2.

Fig. 3.

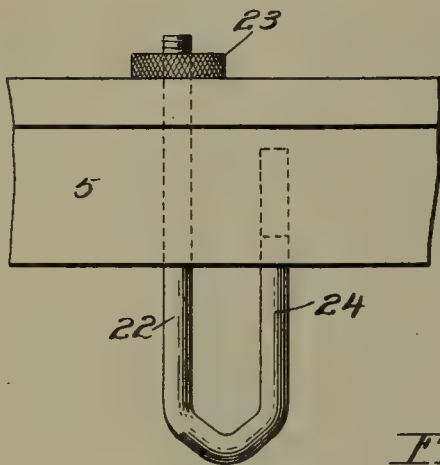


Fig. 4.

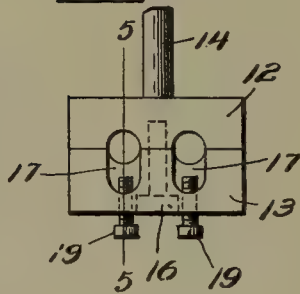


Fig. 5.

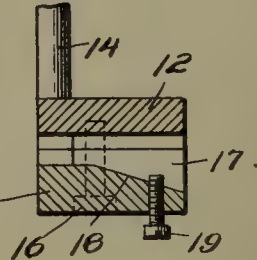


Fig. 6.

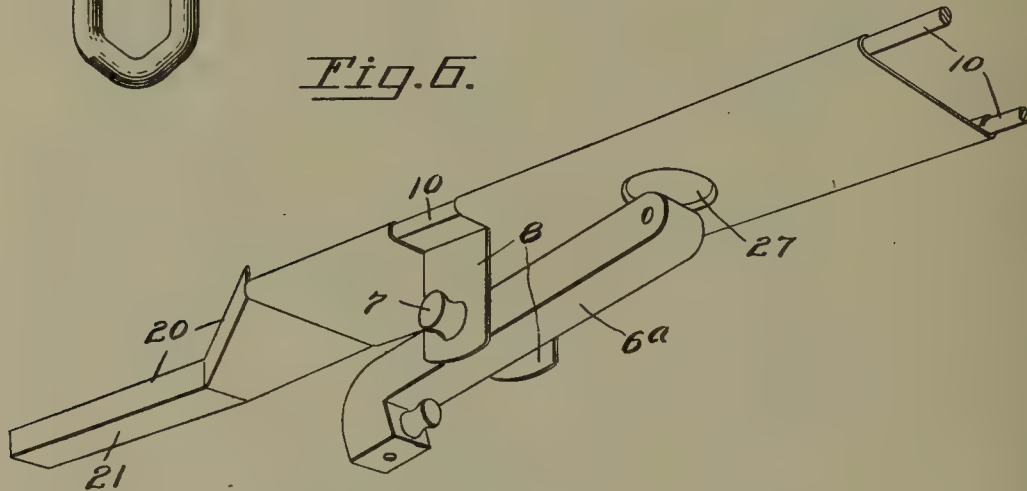
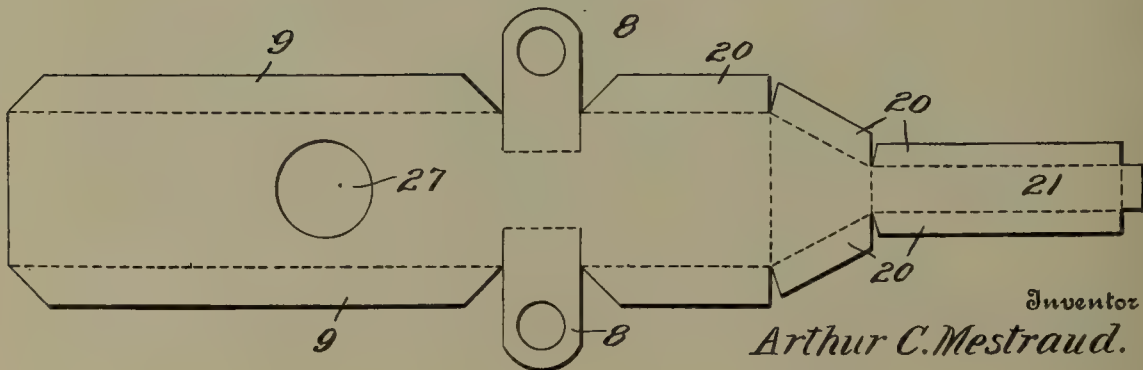


Fig. 7.



Inventor
Arthur C. Mestraud.

Witnesses

E. L. Gibson.

[Signature]

By

Victor J. Evans

Attorney

UNITED STATES PATENT OFFICE.

ARTHUR C. MESTRAUD, OF LINCOLN, NEBRASKA, ASSIGNOR TO OSCAR J. JUNGE, OF
LINCOLN, NEBRASKA.

REPRODUCER FOR PHONOGRAPHS.

No. 880,320.

Specification of Letters Patent.

Patented Feb. 25, 1908.

Application filed June 18, 1907. Serial No. 379,617.

To all whom it may concern:

Be it known that I, ARTHUR C. MESTRAUD, a citizen of the United States, residing at Lincoln, in the county of Lancaster and State of Nebraska, have invented new and useful Improvements in Reproducers for Phonographs, of which the following is a specification.

This invention relates to reproducers for phonographs, and one of the principal objects of the same is to obviate the use of a counterweighted stylus arm in devices of this character.

Another object of the invention is to provide a reproducer or sound box in which the stylus arm is mounted upon a spring, and in which means are provided for adjusting the tension of the spring to regulate the yielding character of the stylus arm.

Still another object of the invention is to provide a reproducer of simple construction in which weights are entirely dispensed with, and in which the spring for supporting the stylus arm may be quickly adjusted to regulate the bearing of the stylus in the sound grooves of the record.

These and other objects may be attained by means of the construction illustrated in the accompanying drawings, in which:

Figure 1 is a central vertical section of a reproducer or sound box made in accordance with my invention. Fig. 2 is an underside plan view of the same. Fig. 3 is a detail side view of the limit loop for supporting one end of the stylus arm spring. Fig. 4 is a detail front elevation of the spring-holding members. Fig. 5 is a sectional view of the same, taken on the line 5—5, of Fig. 4. Fig. 6 is a perspective view of the stylus arm and the supporting device therefor. Fig. 7 is a plan view of the sheet metal blank for holding the stylus arm spring.

Referring to the drawing for a more particular description of my invention, the numeral 1 designates the intake nipple provided with an annular flange 2, screw threaded upon its outer edge, as at 3, to fit the interior screw threads 4 of the diaphragm ring 5. The diaphragm 6 is disposed between two circular gaskets 7^a which are clamped between the lower surface of the annular flange 2, and the upper surface of the flange on the ring 5, as shown more particularly in Fig. 1.

The stylus arm or lever 6^a is pivotally connected upon a pin 7 which passes through the lever 6^a and through a pair of spaced ears 8

depending from a sheet metal supporting plate having its edges 9 bent over upon the body of the plate for holding in connection therewith a pair of spring wires 10 provided with spring coils 11. The terminal ends of the spring wires 10 are mounted between two bearing members 12, 13, the member 12 being supported upon a threaded pin 14 extending through the diaphragm ring and provided with a milled nut 15 for detachably connecting the same to said ring. The lower member 13 is connected to the member 12 by means of a screw 16, and slots 17 are formed in the members 12 and 13 and disposed in alinement, as shown in Fig. 4. The member 13 has a beveled lower wall 18 which permits the two spring members 10 to lie in an inclined position in the slots 17, and adjusting screws 19 extend through the lower wall of the member 13 and are adapted to bear against the springs 10 for adjusting the same. The spring holding plate is provided with side flanges 20 which are bent over the body of the plate, and forming a reduced end 21 which is supported in the limit loop 22, one end of which is threaded, and fitted with a milled nut 23 on its upper end, said threaded member passing through the diaphragm ring 5, and the opposite member 24 of the limit loop extending into a recess in the lower portion of the diaphragm ring to provide an adjustment of the limit loop by means of a single nut. Connected to one end of the stylus arm or lever is a wire yoke 25, the upper end of which is connected to the button 26 secured centrally to the diaphragm 6, and the lower end of said loop passing through a hole 27 in the supporting plate.

The operation of my invention may be briefly described as follows: When it is desired to adjust the tension of the stylus arm supporting spring, the set screws 19 are adjusted against the terminal ends of the springs 10 to raise and lower the stylus arm relatively to the diaphragm to give a greater or lesser intensity to the reproduction.

From the foregoing it will be obvious that a reproducer or sound box made in accordance with my invention does not require the use of a weight for the stylus arm, and that simple means are provided for adjusting the tension of the stylus and its bearing upon the record.

Having thus described the invention, what I claim is:

1. A sound reproducer for phonographs

comprising a diaphragm ring, a diaphragm seated therein, a pair of springs, a supporting plate for said springs, a stylus arm pivoted to said plate and connected to said diaphragm, and adjusting screws for regulating the tension of said springs.

2. A reproducer for phonographs comprising an intake nipple having an annular flange, a diaphragm ring, a diaphragm seated between said flange and ring, a supporting plate, springs secured to said plate, means for supporting said springs at one side of the diaphragm ring, set screws for adjusting the tension of said springs, a stylus arm pivotally connected to said plate, and a yoke connected to the diaphragm button and to the stylus arm.

3. In a sound box for phonographs, the combination of a supporting plate, a pair of springs connected to said plate, adjusting devices for said springs, a stylus arm pivoted to said plate and connected to the diaphragm, and a limit loop for supporting one end of the plate, said limit loop having a threaded shank fitted with a nut, and an unthreaded member seated in a recess in the diaphragm ring.

In testimony whereof, I affix my signature in presence of two witnesses.

ARTHUR C. MESTRAUD.

Witnesses:

O. J. JUNGE,
WILLARD E. STEWART.

No. 880,369.

PATENTED FEB. 25, 1908.

W. N. DENNISON.

TILTING TURN TABLE FOR SOUND RECORDING AND
REPRODUCING MACHINES.

APPLICATION FILED JAN. 24, 1907.

2 SHEETS—SHEET 1.

Fig 1.

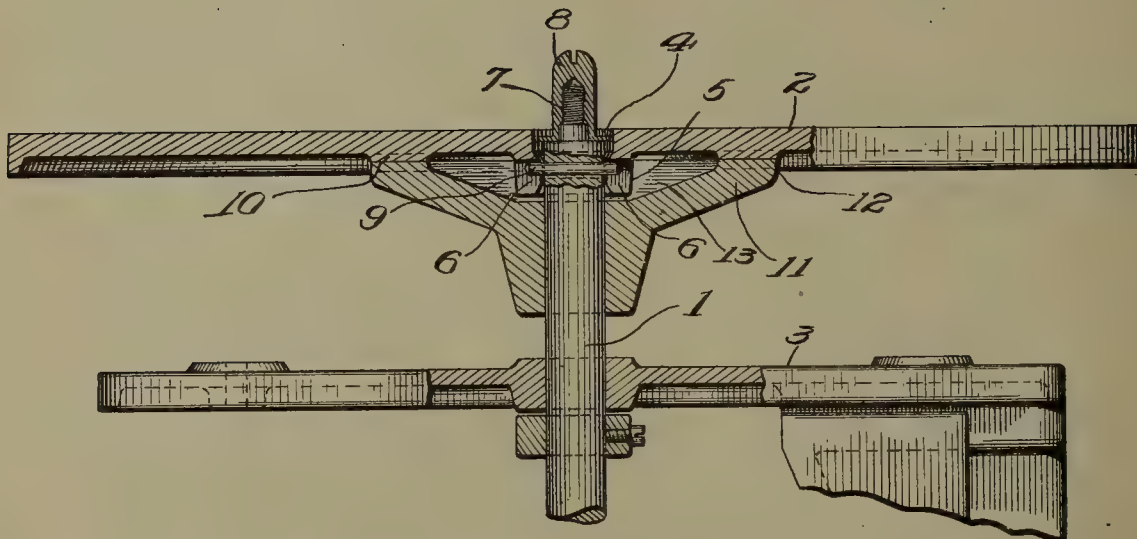
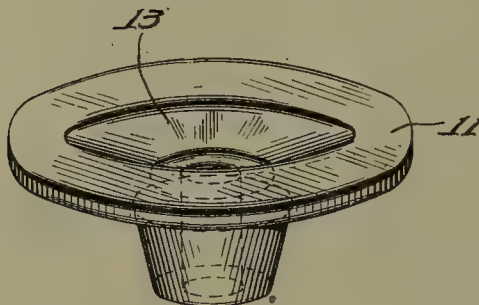


Fig 2.



WITNESSES:

F. J. Hartman.

Alton B. Moulton

INVENTOR

Wilburn N. Dennison

BY

Home Pitts.

ATTORNEY.

W. N. DENNISON.

TILTING TURN TABLE FOR SOUND RECORDING AND
REPRODUCING MACHINES.

APPLICATION FILED JAN. 24, 1907.

2 SHEETS—SHEET 2.

Fig. 3.

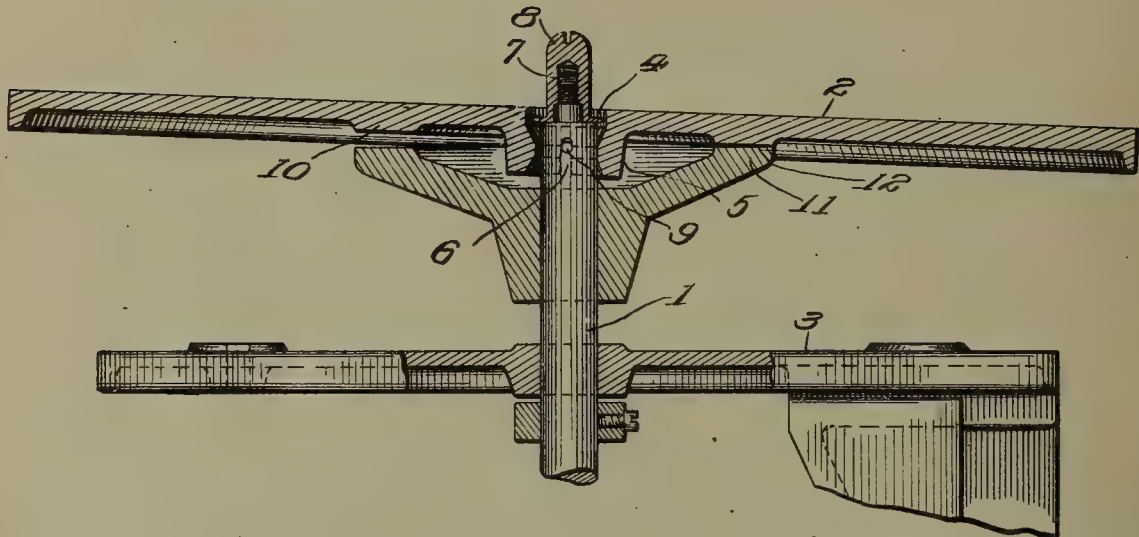


Fig. 4.

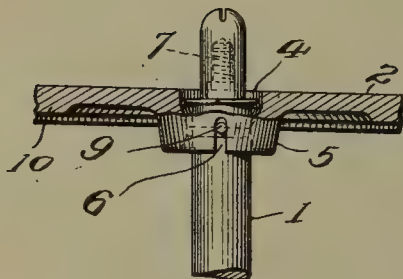
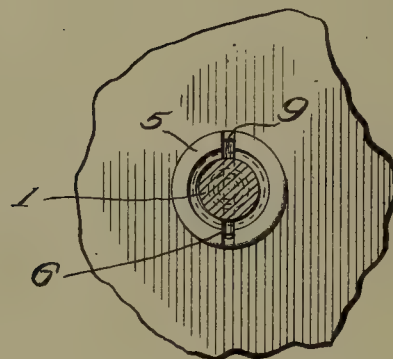


Fig. 5.



WITNESSES:
H. J. Hartman
Alton B. Moulton

INVENTOR
Wilbur N. Dennison
BY *Wm. Feltz*
ATTORNEY.

UNITED STATES PATENT OFFICE.

WILBURN N. DENNISON, OF MERCHANTVILLE, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TILTING TURN-TABLE FOR SOUND RECORDING AND REPRODUCING MACHINES.

No. 880,369.

Specification of Letters Patent.

Patented Feb. 25, 1908.

Application filed January 24, 1907. Serial No. 353,775.

To all whom it may concern:

Be it known that I, WILBURN N. DENNISON, a citizen of the United States, and a resident of the borough of Merchantville, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Tilting Turn-Tables for Sound Recording and Reproducing Machines, of which the following is a full, complete, and exact disclosure.

One object of this invention is to provide a mounting for a turn-table used with the disk type of sound recording and reproducing machines, which will permit the turn-table to be tilted out of its normal position upon its driving spindle without bringing any undue stress upon the spindle to bend it.

Further objects of my invention are to support the turn-table independently of the spindle by which it is rotated, without having any relative motion between the said parts; to render this portion of the mechanism of a talking machine absolutely noiseless and frictionless; to simplify the construction and to reduce the cost of manufacture.

This invention consists in the novel construction, combination and arrangement of parts hereinafter described and more particularly pointed out in the claims and illustrated in the accompanying drawings, in which

Figure 1 is a central vertical section of a device constructed in accordance with this invention; Fig. 2 is a perspective view of a detail of the device; Fig. 3 is a vertical section of the device showing the turn-table in a tilted position; Fig. 4 is an elevation, partly in section of a central fragment of the device; and Fig. 5 is a bottom view of Fig. 4.

Referring to the drawings, the spindle 1 drives the turn-table or record support 2 which is rotatably mounted as usual in the frame 3 of the machine and is actuated by any suitable means. The record support 2 is provided with a central aperture 4 and with a downwardly extending hub 5, provided with oppositely disposed radial slots 6 in the lower edge thereof. The said aperture 4 converges inwardly from both sides of the support. The said shaft 1 is provided with a reduced upper end 7 which is threaded to receive a nut 8. The nut 8 is in the form of an elongated cylinder having a screw slot at its upper end and a flange at its lower end which bears against the shoulder of the shaft and projects into the

end of the aperture in the record support, and has a diameter greater than the smaller diameter of the aperture in the support so as to prevent the record support from being entirely withdrawn from the shaft without the removal of the nut. The nut also furnishes a bearing for the record when it is placed upon the record support. The upper end of the shaft is provided with a pin 9 which extends through the shaft and projects laterally therefrom and engages in the said slots 6 of the record support to form a means of rotating said support. The lower face of the record support 2 is provided with a downwardly facing circular track 10, concentric with the support. Rigidly secured to the shaft 1 below the record support is the disk 11, which is provided with an upwardly facing circular bearing 12 engaging against the said tracks of the record support to carry the same. The upper surface of the disk 11 is provided with a central recess 13 into which extends the said hub of the record support. With this construction in mind it is evident that the record support 2, when tilted upon its bearing, slides longitudinally upon its driving shaft, and the shape of the central aperture of the record support is such that no lateral pressure is brought to bear upon the driving shaft to bend it.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States, is:

1. In a sound recording and reproducing machine, a record support, means for rotating the same, and a bearing for said record support rotated by said means, said record support being freely tiltable away from and towards said bearing.

2. In a sound recording and reproducing machine, a record support, means for rotating the same, a bearing for said support rotated by said means, said record support being freely movable away from and towards said bearing.

3. In a sound recording and reproducing machine, a record support, means for rotating the same, and a rigid bearing for said record support, rotated by said means, said support being freely tiltable away from and towards said bearing.

4. In a sound recording and reproducing machine, a record support provided with a central aperture, a driving spindle therefor extending through said aperture, and a

bearing for said record support rotated by said spindle, said record support being freely tiltable away from and toward said bearing.

5 In a sound recording and reproducing machine, a record support provided with a doubly tapering central aperture, a driving spindle therefor extending through said aperture and a bearing for said record support rotated by said spindle, said record support being freely tiltable away from and towards said bearing.

6. In a sound recording and reproducing machine, a record support provided with a doubly tapering central aperture and a slot extending therefrom, a driving spindle therefor extending through said aperture, a projection upon said spindle engaging said slot, and a bearing for said record support rotated by said spindle, said record support being freely tiltable upon said bearing.

7. In a sound recording and reproducing machine, a record support provided with a bearing surface and a central aperture, a driving spindle therefor extending through said aperture, a disk rigidly fixed upon said spindle and having an upwardly facing circular bearing for said track, said record support being freely tiltable towards and away from said bearing.

8. In a sound recording and reproducing machine, a record support provided with a downwardly facing bearing surface, a downwardly extending hub provided with a central aperture, a driving spindle therefor extending through said aperture, and a disk rigidly fixed upon said spindle and having an upwardly facing bearing and a central recess in its upper face, said record support being freely tiltable towards and away from said bearing.

9. In a sound recording and reproducing machine, a record support provided with a downwardly facing circular bearing surface, a downwardly extending hub provided with a central aperture and a slot in the lower edge thereof, a driving spindle therefor extending through said aperture, a projection from said spindle engaging in said slot, a disk rigidly fixed upon said spindle, having an upwardly facing bearing for said bearing surface, and a central recess in its upper face, said record support being freely tiltable away from and towards said bearing.

10. In a sound recording and reproducing machine, a record support provided with a downwardly facing circular bearing surface a downwardly extending hub provided with a central aperture and a slot in the lower edge thereof, a driving spindle therefor extending through said aperture, a projection upon said spindle engaging in said slot, means upon said spindle for limiting the motion of said record support longitudinally thereof, a disk rigidly fixed upon said spindle and having an upwardly facing circular bearing for said bear-

ing surface and a central recess in its upper face, said record support being freely tiltable from and towards said bearing.

11. In a sound recording and reproducing machine, a record support provided with a downwardly extending hub provided with a central aperture and a slot in the lower end thereof, a driving spindle therefor extending through said aperture, a projection upon said spindle engaging said slot, said spindle having a reduced upper threaded end, a nut upon said end bearing against the shoulder of said spindle and limiting the upward motion of said record support, a disk rigidly fixed upon said spindle and having an upwardly facing circular bearing for said record support and a central recess in its upper face, said record support being freely tiltable from and toward said bearing.

12. In a sound recording and reproducing machine, a record support provided with a downwardly facing circular bearing surface a downwardly extending hub provided with a central aperture and a slot in the lower edge thereof, a driving spindle therefor extending through said aperture, a projection upon said spindle engaging in said slot, said spindle having a reduced upper threaded end, an elongated cylindrical nut upon said end bearing against the shoulder of said spindle to limit the upward motion of the record support and to form a means for retaining a record upon said support, a disk rigidly fixed upon said spindle and having an upwardly facing circular bearing for said bearing surface and a central recess in its upper face, said record support being freely tiltable from and towards said support.

13. In a sound recording and reproducing machine, a record support provided with a central aperture, a driving spindle therefor extending through said aperture, a bearing for said record support rotated by said spindle, and means for limiting the motion of said record support with respect to said shaft, said means consisting of a nut secured to the end of said shaft and extending into and projecting upwardly from said aperture.

14. In a sound recording and reproducing machine, a record support provided with a central aperture, a driving spindle therefor extending through said aperture, a bearing for said record support rotated by said spindle and means for limiting the motion of said record support with respect to said shaft, said record support being freely tiltable with respect to said shaft, said means consisting of a nut secured to the end of said shaft and projecting upwardly from the face of the record support and adapted to receive a record thereover.

15. In a sound recording and reproducing machine, a record support provided with a central aperture, a driving spindle therefor extending through said aperture, a bearing

for said record support rotated by said spindle, means for limiting the motion of said record with respect to said shaft, said means consisting of a cylindrical nut secured to the end of said shaft and extending into said aperture and projecting above the face of said support to receive a record freely thereover, said nut being of greater diameter at its lower end than the small diameter of the aperture in the record support.

16. In a sound recording and reproducing machine, the combination with a record support provided with an aperture, of a spindle extending into said aperture, and means secured to said spindle for limiting the longitudinal motion of said record support with respect thereto, said record support being freely tiltable with respect to said spindle.

17. In a sound recording and reproducing machine, the combination with a record support provided with an aperture, of a spindle extending into said aperture, and a nut secured to the end of said spindle for limiting the longitudinal motion of said record support with respect to said spindle, said record support being freely tiltable with respect to said spindle.

18. In a sound recording and reproducing machine, the combination with a record support provided with a central aperture, of a spindle extending loosely through said aperture, and a nut mounted upon the end of said spindle and extending into said aperture for limiting the longitudinal motion of said record support with respect to said spindle.

19. In a sound recording and reproducing machine, a record support, means for rotating the same, and a rigid bearing for said record support in a plane parallel thereto rotated by said means, said record support being freely tiltable away from and towards said bearing.

20. In a sound recording and reproducing machine, a record support, means for rotating the same, a rigid bearing for said support in a plane parallel thereto rotated by said means, said record support being freely movable away from and towards said bearing.

21. In a sound recording and reproducing machine, a record support, means for rotating the same, and a rigid bearing for said record support in a plane parallel thereto rotated directly by said means, said support being freely tiltable away from and towards said bearing.

22. In a sound recording and reproducing machine, a record support provided with a central aperture, a driving spindle therefor extending through said aperture, and a rigid annular bearing for said record support surrounding said aperture and rotated directly by said spindle, said record support being freely tiltable away from and toward said bearing.

23. In a sound recording and reproducing machine, a record support provided with a doubly tapering central aperture, a driving spindle therefor extending through said aperture and a rigid bearing for said record support surrounding said aperture and rotated direct by said spindle, said record support being freely tiltable away from and towards said bearing.

24. In a sound recording and reproducing machine, a record support provided with a doubly tapering central aperture and a slot extending therefrom, a driving spindle therefor extending through said aperture, a projection upon said spindle engaging said slot, and a rigid bearing for said record support rotated direct by said spindle, said record support being freely tiltable upon said bearing.

25. In a sound recording and reproducing machine, a record support, a bearing for said record support, and means for rotating said record support and said bearing at the same speed, said support being freely tiltable away from and toward said bearing.

In witness whereof I have hereunto set my hand this 22nd day of January, A. D. 1907.

WILBURN N. DENNISON.

Witnesses:

HARRY COBB KENNEDY,
ALSTON B. MOULTON.

No. 880,388.

PATENTED FEB. 25, 1908.

F. M. MURPHY.
PHONOGRAPH HORN.
APPLICATION FILED MAR. 11, 1907.

FIG. 1.

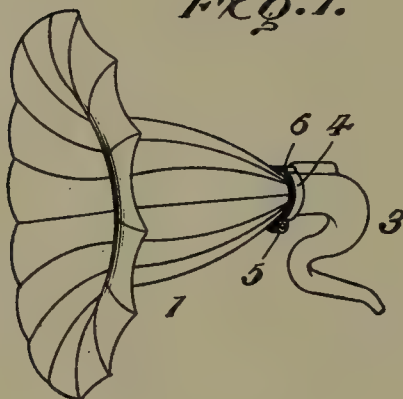


FIG. 2.

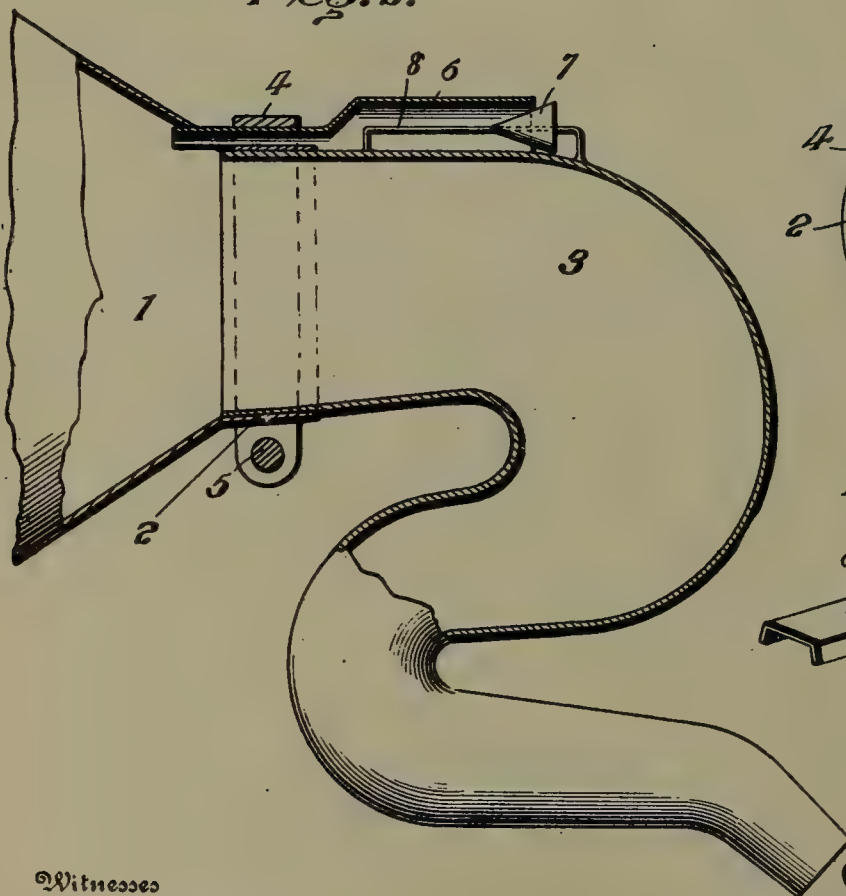


FIG. 4.

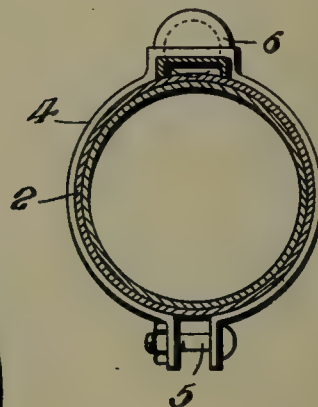
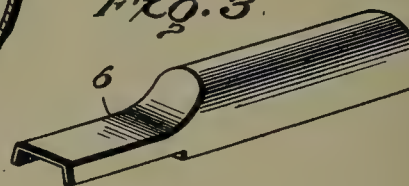


FIG. 3.



Witnesses
Edmund W. Ewan

Inventor
F. M. Murphy,
By *R. A. Racy*,
Attorneys

UNITED STATES PATENT OFFICE.

FRANCIS M. MURPHY, OF JERSEY CITY, NEW JERSEY, ASSIGNOR OF ONE-HALF TO THOMAS FLANAGAN, OF JERSEY CITY, NEW JERSEY.

PHONOGRAPH-HORN.

No. 880,388.

Specification of Letters Patent.

Patented Feb. 25, 1908.

Application filed March 11, 1907. Serial No. 361,855.

To all whom it may concern:

Be it known that I, FRANCIS M. MURPHY, citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Phonograph-Horns, of which the following is a specification.

This invention relates to horns for talking machines generally, the purpose being to modify the sound by the application of a valve controlled air inlet located in the length of the horn and preferably about at the juncture of the base or stem with the body of said horn.

In the specific application of the invention, the horn comprises a body or bell portion and a stem or base, the parts being separable and the base or stem being tapered and reversely curved in its length, said base or stem having securing means for positive attachment thereto of the bell or body portion of the horn and provided with the valve controlled air inlet at or near its larger or coupling end.

For a full description of the invention and the merits thereof and also to acquire a knowledge of the details of construction and the means for effecting the result, reference is to be had to the following description and accompanying drawings.

While the invention may be adapted to different forms and conditions by changes in the structure and minor details without departing from the spirit or essential features thereof, still the preferred embodiment is shown in the accompanying drawings, in which:

Figure 1 is a perspective view of a phonograph horn embodying the invention. Fig. 2 is a longitudinal section of a portion of the stem or base and the contracted end of the horn body or bell. Fig. 3 is a detail view of the coupling end of the stem or base showing more clearly the clamp means for securing the horn thereto. Fig. 4 is a transverse sectional view taken at the junction of the horn and stem.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The numeral 1 indicates the horn proper which is of bell or flared form, its contracted end terminating in a collar 2. The

base or stem 3 is tapered throughout its length and may be of any material and for compactness of arrangement is reversely curved, its smaller end being designed for attachment to the reproducer of any style of talking or sound reproducing machine. To insure formation of a tight joint between the body of the horn and the stem, the latter is provided with a clamp 4 consisting of a slit portion of said stem or base and having the portions bordering upon the slit bent to form ears and adapted to be connected by means of a set screw 5. An air chamber 6 is located at one side of the stem or base at or near its coupling end and communicates with the interior thereof and opens at its rear end exterior to the stem or base to admit air into the horn. A valve 7 of conical construction is adapted to close the exterior opening of the air chamber and is slidably mounted upon a rod 8 arranged within the chamber and may be moved so as to uncover the same more or less as may be required to effect the desired result.

The base or stem practically increases the length of the horn and throws the same at a greater distance from the reproducer, thereby obviating the rattle common to sound reproducing machines. The same results may be obtained by a straight stem or base but in order to reduce the length and economize space the base or stem is reversely curved. As a result of the stem or base, the tone quality of the horn and the volume thereof is increased. The provision of the air inlet enables the sound to be moderated or increased and by adjustment of the valve, the sound may be regulated to meet certain requirements. By having the stem or base detachably connected with the horn, the parts may be separated so as to be more readily handled and conveniently stored.

Having thus described the invention, what is claimed as new is:

1. A horn for sound reproducing machines having an air chamber arranged upon one side thereof, one side of the said chamber communicating with the interior of the horn while the opposite side opens exteriorly, and a valve controlling the exterior opening of the chamber.

2. A horn for sound reproducing machines having an air chamber arranged upon one side thereof, one end of the chamber communicating with the interior of the horn

while the opposite end opens exteriorly thereof, and a slidably mounted valve for controlling the effective size of the exterior opening of the chamber.

- 5 3. A horn for sound reproducing machines having an air chamber in communication therewith, a guide rod arranged within the chamber, and a conical valve slidably mounted upon the guide rod and operating to control the effective size of the mouth of the air chamber.

10 4. In a device of the character described,

the combination of a tubular base, a horn detachably connected to the base, the said base carrying an air chamber communicating with the interior of the horn, and a valve controlling the effective size of the mouth of the air chamber. 15

In testimony whereof I affix my signature in presence of two witnesses.

FRANCIS M. MURPHY. [L. s.]

Witnesses:

SETH E. LOCKLIN,

THOS. FLANAGAN.

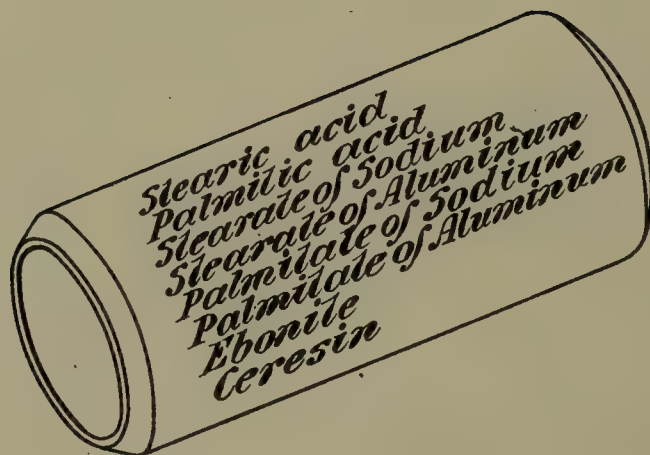
No. 880,707.

PATENTED MAR. 3, 1908.

J. W. AYLSWORTH.

COMPOSITION FOR MAKING DUPLICATE PHONOGRAPH RECORDS.

APPLICATION FILED FEB. 5, 1908.



Witnesses:

Frank D. Lewis
Delos Holden

Inventor:

Jonas W. Aylsworth
by Frank L. [Signature]
Atty.

UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

COMPOSITION FOR MAKING DUPLICATE PHONOGRAPH-RECORDS.

No. 880,707.

Specification of Letters Patent.

Patented March 3, 1908.

Application filed February 5, 1906. Serial No. 299,630.

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Composition for Making Duplicate Phonograph-Records, of which the following is a specification.

In my Patent No. 782,375, of February 14, 1905, I describe an improved composition for making phonograph records, in which a hard wax such as carnauba is added to the usual stearates of soda and alumina for the purpose of making a hard composition having the desirable properties pointed out for use in this particular art, a non-hygroscopic ingredient, such as ceresin, being also preferably added and a black pigment being employed to give to the resulting composition a dark color. The supply of carnauba wax is relatively limited, and the demand created for the same in this art has been so great as to make the price objectionably high. In my search for a suitable ingredient that could be used in these compositions to replace the carnauba wax, I have discovered a material which is suitable for this purpose.

Two species of the material in question are articles of commerce which are on sale in the United States by the Strohmeier & Arpe Company, 64 Pearl street, borough of Manhattan, New York city, under the trade names of "ebonite" and "montan wax" respectively. The former species is a waxlike substance which is blacker and harder than ozocerite. The latter species is also a waxlike substance and is of a dark yellowish brown, somewhat resembling discolored carnauba wax. These substances, as I am informed and believe, are extracted from certain kinds of bituminous brown coal, by a certain process of distillation or solution, the full details of which are not known to me as they are kept as trade secrets by the manufacturers. I do know, however, that the substances in question can be obtained from certain kinds of bituminous brown coal according to the process of United States Patent No. 689,381, dated December 24, 1901. The product which is obtained after driving off the benzin or benzene and which is described in lines 44 to 47 page 1, of the patent, is the same substance as the article known in commerce as "montan wax." If this substance be now distilled with steam as de-

scribed in the patent, a wax-like material is distilled off leaving a residue. The patentee describes the distillation as being continued until this residue is coked. It is not necessary, however, to carry the distillation to this point, but on the other hand the distillation may be stopped while the residue is in the form of a black wax-like substance. Such a residue is the same substance as that which I have referred to as "ebonite."

Both ebonite and montan wax are cheaper than carnauba and produce equally desirable compositions. In addition they possess advantages by which they are actually superior to carnauba wax. In the first place they are both less affected by moisture than carnauba wax. They have fewer products of decomposition, so that less opportunity is offered for forming gas bubbles and in consequence it becomes possible to turn out a higher percentage of records and the latter are of superior appearance. Furthermore, when ebonite is used, the use of a black pigment, such as lamp black, is unnecessary, since the ebonite renders the composition black. This is an important practical advantage, since when lamp black is used it settles in the kettles and becomes unevenly distributed, so that the resulting records are not uniform, and furthermore, its presence on the surface of the records results in undue wear on the reproducing stylus. A record formed of a composition employing ebonite is, therefore, distinguished from those made of my previous composition in the respect that its entire mass can be brought to a molten condition by the application of heat, whereas with the previous composition, even when the bulk is in a melted state, the fine lamp black particles are unaffected. Although ebonite and montan wax are not quite so hard as carnauba wax, this fact is actually an advantage, since a larger percentage of these substances may be employed, which is desirable owing to their low cost.

In forming a composition suitable for the manufacture of phonograph records containing the material in question, I proceed along the lines described in my said patent. I have obtained excellent results by the use of the following formulas:—

(1) To 100 lbs. of stearic acid add 41.9 lbs. of ebonite and 7.377 lbs. of ceresin and melt the same in a suitable iron caldron or other

vessel at a temperature of about 240 degrees Fahr. The stearic acid is the commercial article which, as is known, is a mixture of stearic and palmitic acids, although either of these acids could be used alone if it could be obtained. The stearic acid used melts at about 136 degrees Fahr. Care should be taken to see that the stearic acid is substantially free from oleic acid, as well as from mineral acids, salts, glycerin, and undecomposed fats, as tallow, &c. It should also be free from mucilaginous substances. When the stearic acid is fully melted, I add to the same a water solution obtained by dissolving in four gallons of water contained in a suitable steam-jacketed caldron, 22.6 lbs. of sal-soda, 474.74 grams of caustic soda of the best commercial grade, and 183.72 grams of metallic aluminium, preferably small pieces of thin sheet aluminium. When all the metal is dissolved, the solution is filtered while still hot in a filter-press or in any other way. In adding the alkaline solution to the melted stearic acid I gradually raise the temperature of the latter so as to correspond to the increased melting point of the mixture. The alkaline solution is added as rapidly as possible without unduly running the temperature down or causing excessive boiling or foaming. The solution can be added quite rapidly at first but toward the end it must be added very slowly. The addition of the alkaline solution to the stearic acid results in the production of stearates and palmitates of soda and of aluminium which are metallic soaps or metallic salts of fatty acids. During the saponification which thus takes place water and carbon dioxide are driven off. At the end of the operation the temperature will have gradually run up to about 360 degrees Fahr. The temperature of the mass is then raised to about 450 degrees Fahr. and maintained until all foaming ceases, the use of this high temperature being desirable although not absolutely necessary. The purpose of the ceresin is to make the mixture non-hygroscopic and also less brittle than it otherwise would be; and the ceresin may be replaced, if desired, by other hydro-carbon waxes, such as paraffin or ozocerite.

The congealing temperature of the product may be regulated by adding free stearic acid thereto. I find that in dealing with temperatures above 290 degrees Fahr. the addition of 1% by weight of stearic acid, effects a drop of about 5 degrees Fahr. in the congealing-point. Obviously this regulation of the congealing-point of the mixture depends upon the special process which is to be followed in making duplicates, and where the congealing temperature is not important no attention whatever need be paid to its regulation, the proportion of ingredients stated being suitable for producing phono-

graph records according to the process described in Patent No. 683,615 granted October 1, 1901 to Miller and Aylsworth. The material is now strained preferably through open muslin and is ready for use.

(2) In preparing a combination containing montan wax instead of ebonite, the process followed is exactly the same except as to the relative proportions of the ingredients which may be as follows: 100 lbs. of stearic acid, 19 lbs. of montan wax, 19 lbs. of ceresin, 1 lb. of lamp black, to which is added an alkaline solution obtained by dissolving in five gallons of water 22 lbs. of sal-soda, 460 grams of caustic soda and 178 grams of metallic aluminium.

Both ebonite and montan wax may be used in the same composition if desired, in which case the ingredients may be the sums of the quantities set forth in the above formulas; that is to say, 200 lbs. of stearic acid, 41.9 lbs. of ebonite, 19 lbs. of montan wax, 26.377 lbs. of ceresin and 1 lb. of lamp black, to which is added a solution in nine gallons of water, of 44.6 lbs. of sal-soda, 934.74 grams of caustic soda and 361.72 grams of metallic aluminium.

Reference is hereby made to the accompanying drawing which shows a phonographic record tablet with the names of the ingredients of formula 1 inscribed thereon.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:—

1. A composition suitable for the manufacture of phonograph records which contains a wax-like substance extracted from bituminous coal and harder than paraffin, substantially as set forth.

2. A composition suitable for the manufacture of phonograph records which contains the wax-like substance known as ebonite, substantially as set forth.

3. A composition suitable for the manufacture of phonograph records which contains the wax-like substance known as montan wax, substantially as set forth.

4. A composition suitable for the manufacture of phonograph records which contains a metallic soap and a wax-like substance extracted from bituminous coal and harder than paraffin, substantially as set forth.

5. A composition suitable for the manufacture of phonograph records, which contains a metallic soap and the wax-like substance known as ebonite, substantially as set forth.

6. A composition suitable for the manufacture of phonograph records, which contains a metallic soap and the wax-like substance known as montan wax, substantially as set forth.

7. A composition suitable for the manufacture of phonograph records which con-

tains a metallic soap, a hydrocarbon and a wax-like substance extracted from bituminous coal and harder than paraffin, substantially as set forth.

5 8. A composition suitable for the manufacture of phonograph records, which contains a metallic soap, a hydrocarbon and the wax-like substance known as ebonite, substantially as set forth.

10 9. A composition suitable for the manufacture of phonograph records, which contains a metallic soap, a hydrocarbon, and the wax-like substance known as montan wax, substantially as set forth.

15 10. A composition suitable for the manufacture of phonograph records, which con-

tains a metallic soap, a wax-like substance extracted from bituminous coal and harder than paraffin and a black pigment, substantially as set forth.

20

11. A composition suitable for the manufacture of phonograph records, which contains a metallic soap, a hydrocarbon, a wax-like substance extracted from bituminous coal and harder than paraffin, and a black 25 pigment, substantially as set forth.

This specification signed and witnessed this 2nd day of February 1906.

JONAS W. AYLSWORTH.

Witnesses:

DELOS HOLDEN,
FRANK D. LEWIS.

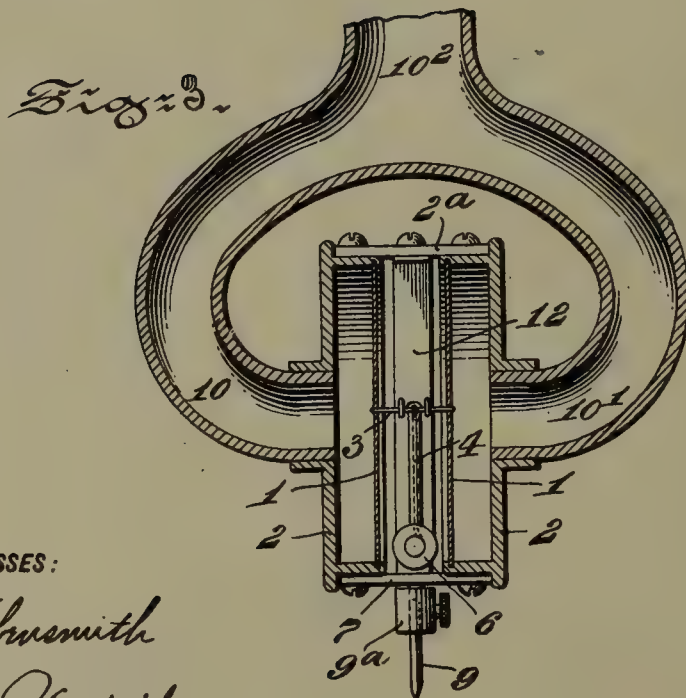
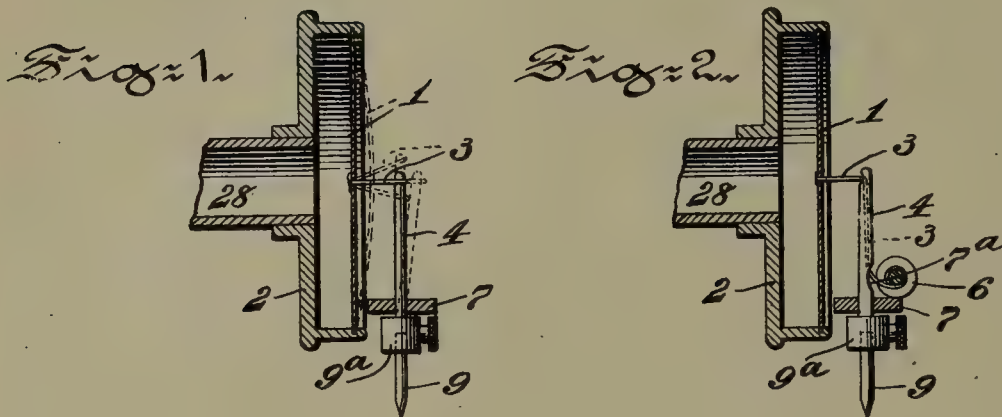
No. 880,879.

PATENTED MAR. 3, 1908.

L. T. HAILE.

GRAMOPHONE OR OTHER SOUND REPRODUCING OR RECORDING MACHINE.

APPLICATION FILED JULY 6, 1906.



WITNESSES:

Geo. C. Wolbrunsmith
A. M. Biddle

INVENTOR

Luther T. Haile
BY
H. V. Heaton
ATTORNEY.

UNITED STATES PATENT OFFICE.

LUTHER T. HAILE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-FIFTH TO MAURICE N. WEYL AND WILLIAM A. MACKIE, ONE-FIFTH TO JOSEPH W. SHANNON, ONE-TWENTIETH TO FREDERICK J. GEIGER, AND ONE-TWENTIETH TO LOGAN W. MULFORD, OF PHILADELPHIA, PENNSYLVANIA.

GRAMOPHONE OR OTHER SOUND REPRODUCING OR RECORDING MACHINE.

No. 880,879.

Specification of Letters Patent.

Patented March 3, 1908.

Application filed July 6, 1906. Serial No. 324,978.

To all whom it may concern:

Be it known that I, LUTHER T. HAILE, a citizen of the United States, residing in the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Gramophones or other Sound Reproducing or Recording Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My improvements have for their general purposes or objects to cause the instrument to produce a clearer, louder and more natural and pleasing tone, by means operating to confine the vibrations which reach the reproducing diaphragm to those only which are caused by the original sound waves recorded on the record; also to wholly prevent the direct vibratory contact of needle with diaphragm and the consequent transmission of vibrations caused by scraping of the needle on the record, due to such direct connection as such parts are usually constructed, this object being effected by the provision of an intermediate flexible and preferably elastic connection between the head of the needle and diaphragm with means hereinafter described to effect such connection; also the provision of simple means to create a tension thereon for regulating the volume or intensity of the sound.

To these ends my invention comprises the means hereinafter fully described to accomplish these several objects, the novel features being pointed out in the appended claims.

In the accompanying drawings illustrating my invention, Figure 1 is a sectional view of the diaphragm and its supporting frame, the record needle and its flexible connection with the diaphragm being shown in elevation, the dotted lines indicating its movements. Fig. 2 is a like view showing a needle, hollow for part of its length below its head, and the cord, forming the flexible connection, passing through the same; Fig. 3 is a section, partly in elevation, of a double diaphragm and a single record needle intermediate the same, with flexible connection between the needle and each diaphragm, sound passages into which each diaphragm directly discharges its sound waves, and a single horn into which

both of said sound passages discharge the sound waves.

Referring now to said drawings:—The diaphragm 1 is of usual construction and mounted, as before, in a sound-box or circular supporting frame 2 having a central aperture opening into the sound conveying tube 28; and, as is well known, the diaphragm is most commonly supported edge-wise and hence set at right angles to the sound record to be reproduced. A guide plate 7 is mounted on the rim of the frame 2, and has a central aperture as usual, its function being to operatively support the needle arm 4 carrying the record needle 9. A collar 9^a is mounted on the needle below the guide plate 7. The vibratory movements of the needle are imparted to the diaphragm through a flexible connection indicated at 3 in the several views, the dotted lines in Fig. 1 showing the vibratory movements in such flexible connection imparted thereto by the needle movements, and transferred through such connection to the diaphragm. This is the most important feature of the invention, the object being to convey sound waves only, the said flexible connection absorbing all other sound vibrations, or rather eliminating all such vibrations as would necessarily arise from having the needle arm connected rigidly, as heretofore, by a curved head or other non-flexible connection, to the diaphragm. For example, the movements of the needle over the record which produce sound waves corresponding thereto, are “in and out” or lateral movements; any vertical movement of the needle has no such result, but on the contrary produces vibrations of the diaphragm which are inconsistent therewith, effecting a “scratchy” sound. Obviously, as indicated by the dotted lines, a flexible connection between needle arm and diaphragm checks or absorbs all such vibrations and consequent sound waves not desired. This principle of a flexible connection between the head of the needle arm and the diaphragm is exemplified in its best form in Fig. 2 of the drawings illustrating means which embody further novel features of my invention. In said Fig. 2 it will be observed the needle arm 4 is shown hollowed out for the greater part of its length above the guide

plate 7, and at the base of the recess is an aperture 7^a through the wall of the hollow needle arm. The flexible connection 3 preferably used is an elastic cord, such as a silk thread, or a very flexible wire or catgut string; the characteristics of such connection determining the choice of material are flexibility, elasticity and non-frictional character. As the latter is not wholly possible, the needle arm is preferably in the form of a hollow cone, to give strength and lightness, and the recess therein is bushed with suitable material, preferably felt or rubber to prevent friction of the cord therewith, aside from which such construction serves to protect the flexible connection from undue wear. Such flexible cord is secured by any suitable means to the center of the diaphragm, passing from thence through the recess in the needle arm and emerging through the aperture 7^a, and is wound on the shaft of a thumb-screw 6. This construction gives an additional and most important advantage, namely, a turn of the thumb-screw in either direction will increase or decrease, as the case may be, the tension of the connecting cord and the diaphragm, thereby varying at will the loudness or softness of tone of the sound waves reproduced through the diaphragm; the means described for so doing being so simple as to be readily comprehended and used by the amateur operator of the instrument. This part of my invention, the chief element of which is the flexible connection described, is a wholly novel departure from any known device of this class, wherein there are no adequate means to adjust the instrument to variations of tone of sound waves, and wherein there is a rigid connection between the needle arm and the diaphragm, hence the latter responds, in vibrations, to every movement of the needle, and owing to irregularities or imperfections commonly in the records, discordant counter vibrations are set up; a defect wholly obviated by my invention described.

The sound-box is operatively supported, by the sound-conveying arm 28, in such relation to the disk-record, as usual, that the vibrations of the needle will be in a plane transverse to that of the plane of the diaphragm, as indicated by the dotted lines in Fig. 1; but a most valuable feature of my invention is that I can utilize the flexible connection to cause two diaphragms of a multiple sound-box to vibrate simultaneously and in opposite directions to each other, by merely changing the operative position of such multiple sound-box and the sound-conveying arm, relatively to the disk-record, that the sound-grooves in the latter will vibrate the needle in the usual way but in a plane parallel with the plane of the diaphragms instead of transversely thereto.

I will now describe a form of my invention

wherein the feature of a double diaphragm, set face to face and vibrating in opposite directions, is embodied.

In Fig. 3 is shown a sound box composed of a pair of diaphragms 1, 1, each mounted in a circular frame 2, as before, and facing each other, said frame being joined and spaced by a bar 2^a at top and by the perforated guide plate 7 at base. In the said space, so formed, between the diaphragms and their frames, a single needle arm and needle, and adjunctive parts as heretofore described in relation to Figs. 1 and 2, are arranged. I prefer however to arrange in such space a metallic bar 12, perforated to allow the passage of the flexible connections to the respective diaphragms and serving as a guiding support for such flexible connections.

The diaphragm frames, shown in Fig. 4 constituting the pair of sound boxes have rearward central openings with which communicate, respectively, the separate tubes 10, 10', leading as branches from a single tube or horn 10². The said frames and the branched horn, for the set of double diaphragms will, however, be made the subject of a separate application for Letters Patent. Both diaphragms are simultaneously vibrated by the same movements of the reproducing needle, hence the sound waves proceeding from the pair of diaphragms and discharged from the single horn will be not only much increased in loudness, but by the adjustment devices heretofore described the quality of the tone may be regulated. In this form of the device a detail of some importance may be added if desired, namely, the flexible cord connection is made in two parts, one part which passes through and projects above the top of the needle arm 4 is provided with a small loop through which the other flexible cord connection freely passes, its ends being secured to the oppositely-disposed diaphragms.

It is obvious that the two first described and leading features of my invention or either of them may be used, in like manner in machines of this class for recording sound waves as well as for reproducing them from a record or tablet. And it is further to be observed that in the following claims the word "cord" employed to designate the "flexible connection" is not to be construed as limiting that element to what is technically a string or cord, but to be inclusive of any equivalent therefor such as I have recited in the foregoing specification.

Having thus described my invention I claim as new and desire to secure by Letters Patent:—

1. In apparatus of the class recited for recording or reproducing sound-waves, the combination with a sound-box containing a diaphragm, a needle-arm adapted to carry a

record needle and having means to guide a vibrating flexible cord leading therefrom to the diaphragm, a perforated guide-plate supporting said elements in operative relation to each other and adapted to traverse the record tablet radially, and a flexible cord-like connection between the needle-arm and the diaphragm operating to transmit the vibrations of the needle directly to the diaphragm, with means carried by said guide-plate operating to increase or decrease the tension in said flexible connection.

2. In apparatus of the class recited, the combination with a diaphragm and means to operatively support the same, of a hollow needle arm, the wall of which is perforated near its base, and a flexible cord passing through the interior of the needle arm and connecting it with the diaphragm.

3. In apparatus of the class recited, the combination with a diaphragm, a stylus or record needle, and means to support each of the same independently but in operative relation, of a hollow needle arm mounted to respond to the vibratory movements of the needle, and means adapted and operating to transmit the lateral vibratory movements only of the needle to the diaphragm, said means consisting substantially of a flexible cord-like connection secured at one end to the basal portion of the needle arm and passing freely through the hollow interior thereof to the diaphragm to which its opposite end is attached.

4. In apparatus of the class recited, the combination with a diaphragm and means to operatively support the same, of a hollow needle arm, a bushing of anti-friction material within the same, and a flexible cord passing through the interior of the needle arm and connecting it with the diaphragm.

5. In apparatus of the class recited, the combination with a diaphragm and means to operatively support the same, a hollow needle arm perforated near its base, a flexible cord passing through the interior of said needle arm and connecting it with the diaphragm, and means to adjust the tension on said flexible connection.

6. In an instrument of the class recited,

the combination with a sound-box containing a diaphragm, a needle arm, a perforated guideplate, a bracket mounted thereon, a thumb-screw working in said bracket, and a flexible and elastic connection between the diaphragm and the needle arm and extending to said thumb-screw whereby the tension in said flexible and elastic connection may be increased or diminished.

7. In an instrument of the class recited, the combination with two diaphragms facing each other, means to support them in spaced relation to each other, a needle arm operatively supported in said space, and a flexible connection between each of said diaphragms and the needle arm, whereby said diaphragms are adapted to vibrate simultaneously but in the opposite direction from each other, and actuated by a single needle arm impinging upon or engaging with the said flexible connection.

8. In an instrument of the class recited, the combination with two diaphragms arranged facing each other, means to support them in spaced relation, a needle arm operatively supported in said space, a flexible connection between each diaphragm, and a second flexible connection secured at one end to the needle arm and having a looped end through which the first flexible connection freely passes.

9. In an instrument of the class recited, the combination with two diaphragms arranged facing each other, means to support them in spaced relation, a needle arm operatively supported in said space, a flexible connection between each diaphragm, and a second flexible connection secured at one end to the needle and having a looped end through which the first flexible connection freely passes, said loop being lined or covered with nonresonant material.

In testimony whereof, I have hereunto affixed my signature this third day of July A. D. 1906.

LUTHER T. HAILE.

Witnesses:

HENRY T. GULLMANN,
JOSEPH W. SHANNON.

T. KRAEMER.
TALKING MACHINE.
APPLICATION FILED DEC. 14, 1907.

Fig. 1,

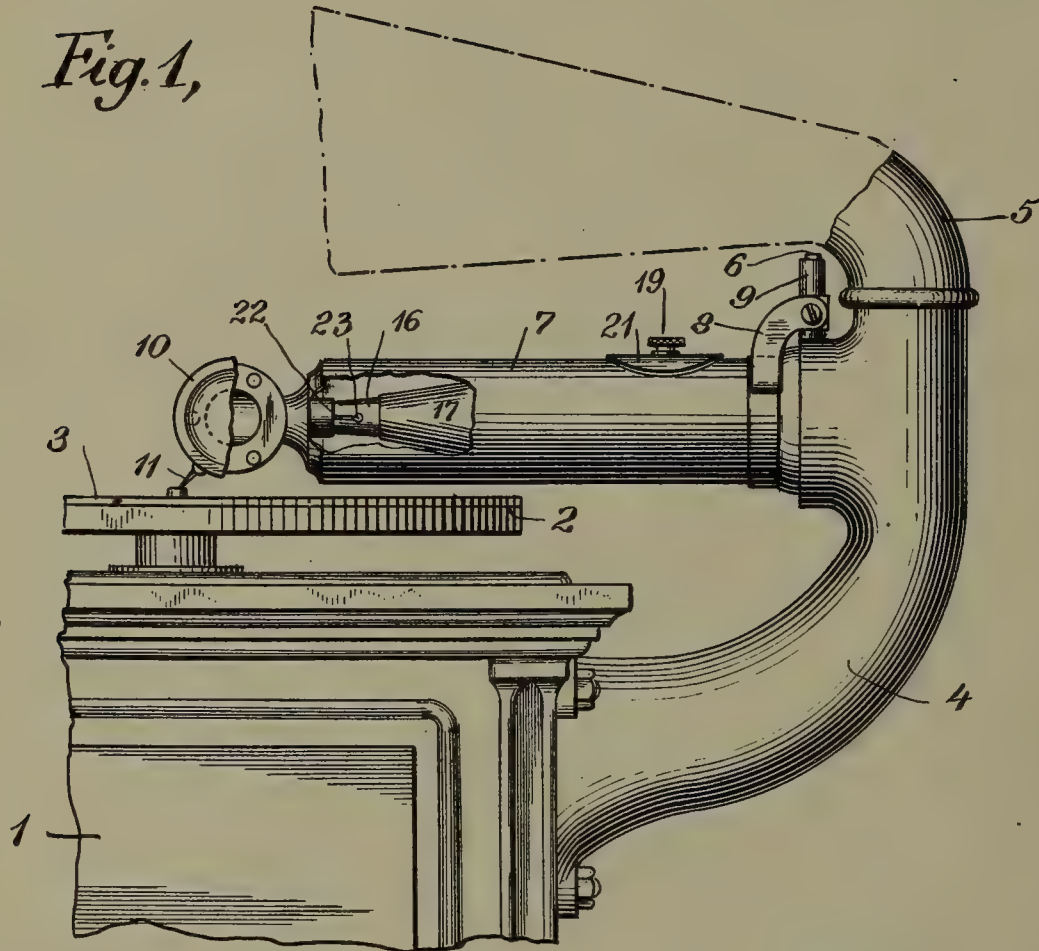


Fig. 2

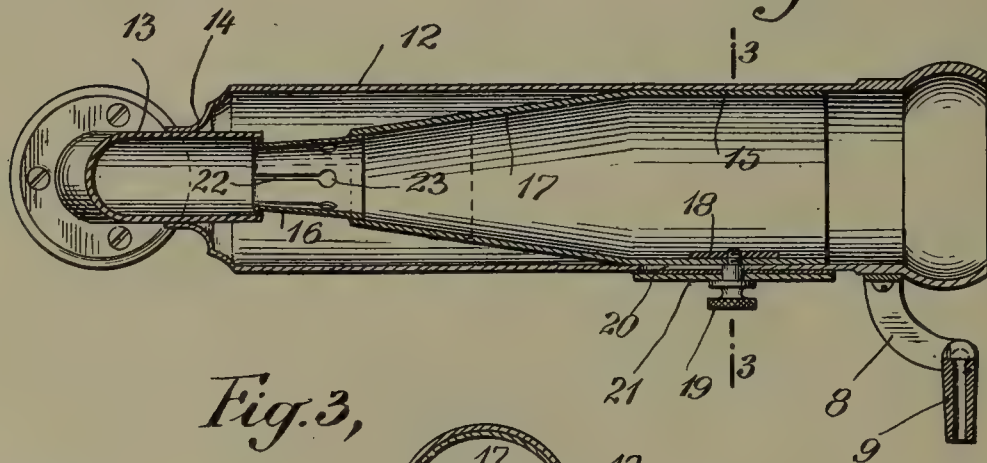
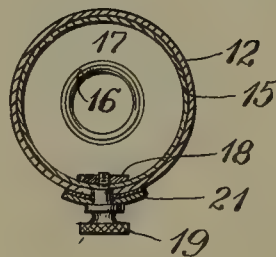


Fig. 3,



WITNESSES:

J. Edwards
J. Barthlett

INVENTOR

Thomas Kraemer

BY

J. V. Edwards
ATTORNEY

UNITED STATES PATENT OFFICE.

THOMAS KRAEMER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

TALKING-MACHINE.

No. 881,322.

Specification of Letters Patent.

Patented March 10, 1908.

Application filed December 14, 1907. Serial No. 406,451.

To all whom it may concern:

Be it known that I, THOMAS KRAEMER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

This invention relates to talking machines and has reference, more particularly, to the sound-conveying devices of such machines.

The invention is directed to the provision of an improved construction of sound-conveying device for a talking machine having therein means for modifying the sound carried thereby as desired, with respect to tone, magnitude, etc.

The invention is of particular utility in a talking machine in which the re-producing mechanism is secured upon the end of a tubular tone-arm which is pivoted upon a support fixed in the motor box of the machine and which connects with an amplifying horn, the sound modifying devices being located within this tubular tone-arm and adjustable from outside the same for the purpose of effecting the desired modification in sound.

The preferred embodiment of my invention is illustrated in the accompanying drawings in which

Figure 1 is an elevation of a portion of a talking machine, Fig. 2 is a longitudinal section of the tone-arm thereof and Fig. 3 is a transverse section of the tone-arm on line 3—3 of Fig. 2.

Referring to these drawings, 1 indicates the motor box of the talking machine having a motor therein driving a vertical shaft which carries the turn-table 2 on which the disk sound-record 3 rests. Secured to the side of the motor box is a coupling member 4 having an opening through the upper portion thereof. A tapering, amplifying horn 5 is adapted to be mounted on the upper end of the member 4, its opening communicating with the opening in the coupling member. Secured on the coupling near the other end of the opening therethrough is a pin 6 on which is supported the tone-arm 7. For this purpose the tone-arm has a yoke 8 secured thereto, on the arms of which is horizontally pivoted a cross-head carrying a sleeve 9 adapted to fit over the pin 6. The end of the tone-arm is arranged to telescope slightly with the coup-

ling member 4, as shown in Fig. 1. To the other end of the tone-arm is secured the sound-box 10 having a stylus 11 which tracks in the groove in the record disk 3.

The construction of the tone-arm is best shown in Figs. 2 and 3; it is of tubular form and consists of two cylindrical sections 12 and 13, the former of which is of considerably greater cross-sectional area than the latter. The free end of section 12 is contracted, as shown at 14, and the smaller section 13 is secured within this contracted portion. The section 13 is curved on an arc of 90 degrees, so that the action of the sound-box secured to the end of this section is at a right angle to the axis of the tone-arm.

The sound modifying device is located within the section 12 of the tone-arm and is adapted to be moved from outside the tone-arm to carry one end thereof within the end of the smaller section 13. This device consists of a portion 15 which fits snugly within the section 12, a portion 16 which is of such size that it may be moved within the end of the section 13, and a portion 17 connecting these two portions 15 and 16 which form the end portions of the sound modifying device and which are of different sizes.

In the drawings, I have shown the portion 17 as being of conical shape and this is the shape I prefer to employ. In the portion 15 and a reinforcing strip 18 secured thereto is a threaded opening adapted to receive the threaded end of a set-screw 19 which extends through an elongated slot 20 in the wall of the section 12 of the tone-arm. Between this screw and the tone-arm is a shield 21 curved so as to lie close upon the surface of the tone-arm; this shield moves back and forth with the screw 19 and the sound modifying device and is of such size that in all positions of those parts it closes the slot 20 in the tone-arm.

The end portion 16 of the sound modifying device is preferably of such size that it will fit tightly within the end of the smaller section 13 of the tone-arm. In order to secure such a tight fit, and insure the easy movement of the parts, the section 16 may be made slightly larger than the interior diameter of the section 13 and may be provided with a plurality of slits 22 extending from its end in the direction of its length. Small openings 23 may be provided at the

ends of the slits 22. As thus constructed the machine is operated in the usual manner and the sound waves emanating from the diaphragm of the sound-box 10 pass through the small section 13 of the tone-arm, the sound modifying device and the larger section 12 of the tone-arm to the amplifying horn 5. By means of the screw 19, which is provided with a knurled head, the sound modifying device may be moved in the direction of the axis of the tone-arm from the position in which it is shown in Fig. 2 to a position in which its smaller end extends within the end of the section 13 of the tone-arm. By moving the sound modifying device back and forth within the tone-arm in this way, the sounds reproduced by the machine may be modified as desired as to their tone, pitch and resonance, by reason of the coaction of the walls of the sound modifier with the sound waves passing through the sound conveying tube. It will be seen that the construction here disclosed is quite simple and that such a tone-arm may be manufactured at low cost.

In practice I have found that with the device here disclosed, a considerable degree of modification of the sounds reproduced may be effected, the different positions of the modifier resulting in making the sound loud or soft and hollow or sharp, so that the character of reproduced sound desired may be readily obtained.

Having described my invention, what I claim as new therein and desire to secure by Letters Patent of the United States is:

1. In a talking machine, a sound-conveying tube comprising two sections secured together one of which is of greater internal cross-sectional area than the other, a sound modifier lying within said larger section and having one end movable within said smaller section, and means connected to said modifier and extending through the wall of the tube for moving the modifier axially of the tube from outside the same, substantially as described.

2. In a talking machine, a sound-conveying tube comprising two sections secured together one of which is of greater internal cross-sectional area than the other, a sound modifier lying within said larger section and having an elastic end portion which is movable within said smaller section, and means

for moving said modifier axially of the tube from outside the same, substantially as described.

3. In a talking machine, a sound-conveying tube comprising two sections secured together one of which is of greater internal cross-sectional area than the other, a tubular, sheet-metal sound-modifier lying within said larger section and having one end entering said smaller section and provided with a plurality of lengthwise cuts to make it elastic, and means for moving said modifier axially of the tube from outside the same, substantially as described.

4. In a talking machine, a sound-conveying tube comprising two sections secured together one of which is of greater internal cross-sectional area than the other, a tubular modifier within said tube having a portion fitting within said larger section, a portion adapted to move within the end of said smaller section and a portion of conical shape connecting said portions, and means for moving said modifier axially of the tube from outside the same, substantially as described.

5. In a talking machine, a sound-conveying tube comprising two sections secured together one of which is of greater internal cross-sectional area than the other, a tubular modifier within said tube having a portion fitting within said larger section, an elastic portion adapted to move and to fit tightly within the end of said smaller section and a portion of conical shape connecting said portions, and means for moving said modifier axially of the tube, substantially as described.

6. In a talking machine, a tone-arm formed of two cylindrical sections secured together one of which is of greater diameter than the other, a tubular sound-modifier within said tube having a portion fitting within said larger section, a portion adapted to move within said smaller section and provided with a plurality of lengthwise cuts to make it elastic and a portion of conical shape connecting said portions, and means for moving said modifier axially of the tube from outside the same, substantially as described.

This specification signed and witnessed this 9th day of December, 1907.

THOMAS KRAEMER.

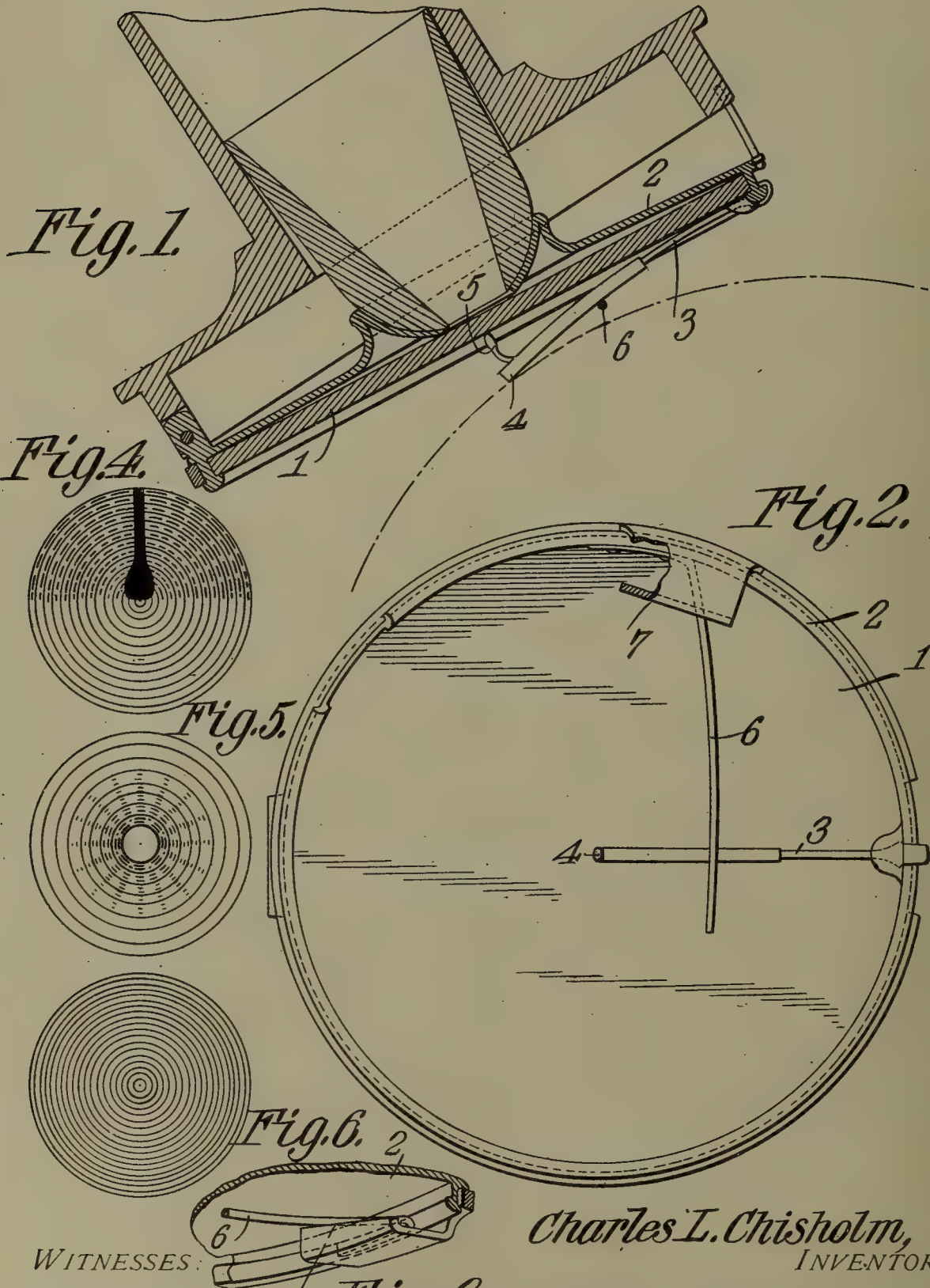
Witnesses:

H. MEIER,
R. GROSS.

No. 881,546.

PATENTED MAR. 10, 1908.

C. L. CHISHOLM.
SPEAKING MACHINE.
APPLICATION FILED JAN. 5, 1907.



WITNESSES:

E. H. Stewart
C. Bradway.

Charles L. Chisholm,
INVENTOR.

Fig. 3.

By

C. A. Snow & Co.
ATTORNEYS

UNITED STATES PATENT OFFICE.

CHARLES L. CHISHOLM, OF MARYSVILLE, NEW BRUNSWICK, CANADA.

SPEAKING-MACHINE.

No. 881,546.

Specification of Letters Patent.

Patented March 10, 1908.

Application filed January 5, 1907. Serial No. 350,979.

To all whom it may concern:

Be it known that I, CHARLES L. CHISHOLM, a subject of the King of England, residing at Marysville, New Brunswick, Canada, have
5 invented a new and useful Speaking-Machine, of which the following is a specification.

The invention relates to acoustic instruments, and particularly to recorders and reproducers for phonographs and similar machines, and the object in view is to provide a construction and arrangement of diaphragm and stylus whereby the sound waves or beats affect the diaphragm on truly concentric
10 lines and the stylus receives an accurate vibration in accordance with the sound or sounds attacking the diaphragm to avoid the formation of secondary or false vibrations due to obstacles in the way of a true and
15 accurate and free vibration of the diaphragm, and thus avoid the formation of such a record as in reproduction will result in secondary or false tones or harmonics. To accomplish this it has been found necessary in the first
20 place, as more fully explained hereinafter, to support the diaphragm so that its surfaces are entirely unobstructed and are free to vibrate and to receive the true wave beats of sound without interference, and to construct
30 and arrange the parts so that the center of the diaphragm is as free as any other portion thereof to receive the impulses of the sound waves, the stylus receiving its motion from the accurate center of the diaphragm on a
35 point which is substantially, if not theoretically, what is known as a geometrical point of no appreciable area. Moreover, it has been found that with the extremely thin and sensitive diaphragm ordinarily employed in
40 machines of this type and made necessary by the fact that the attachment of the stylus is accomplished by wings or disks which obstruct and prevent the vibration of the central portion of the diaphragm, and, also, by
45 the attachment of the stylus arm to the surface of the diaphragm from the central point to the periphery thereof, that not only are the vibrations of the diaphragm broken and interfered with, but the secondary or reduced
50 vibrations owing to this flexibility or sensitiveness, produce false tones and harmonics, and the real over tones which are necessary to give character to the fundamental tones reaching the diaphragm are lost or are dis-
55 posed in opposition to each other, so as to be usually changed in character or nullified.

Therefore, it has been further found that by leaving the diaphragm entirely unobstructed from this central point, which, as above indicated, is of practically no appreciable area to
60 its periphery, a very much thicker and more rigid diaphragm can be employed, and that the over tones can be reproduced and the vibrations accurately and truthfully conveyed to the record so as to be subsequently
65 reproduced.

In addition to the foregoing it has been found that the necessary intimate relation or true contact of the stylus with the center point of the diaphragm can be effected without
70 securing the point of the stylus arm to the diaphragm at such central point, and that depending upon the conditions under which the machine is being used the bearing of the point upon the center of the diaphragm can
75 be varied to produce greater or less tension, and with these and other objects, which will appear as the invention is more fully disclosed, the invention consists in a certain
80 construction, combination and arrangement of parts which will be hereinafter disclosed, it being understood that various changes in the form, proportion, and minor details of construction may be made without departing
85 from the spirit of the invention, which is set forth in the appended claims.

In the accompanying drawings:—Figure 1 is a sectional view of a recorder constructed in accordance with the invention. Fig. 2 is a face view of the same. Fig. 3 is a detail
90 view showing the means for adjusting the spring tension. Figs. 4, 5 and 6 are diagrams of diaphragms showing sound wave formations.

Similar reference characters represent corresponding parts in the several figures of the drawings.

In the illustrated embodiment of the invention, the diaphragm 1, which is from four to ten times the thickness of the diaphragm
100 ordinarily employed in recorders and reproducers, is peripherally supported in the frame or head 2, and the stylus, which, for convenience, may be described as consisting of the stylus arm 3 and the graver or stylus
105 point 4, is attached at the outer extremity of the arm portion to the surface of the diaphragm at, or immediately over the bearing of this diaphragm upon its support, or, in other words, at the dead or non-vibratory portion
110 of the diaphragm. The stylus arm is of yielding spring quality, having a spring

tendency toward the diaphragm with its contact point 5 reduced to bear upon the geometrical center of the diaphragm with the minimum area of contact.

5 In order that the tension of the stylus arm, or the spring tendency thereof toward the diaphragm may be varied, a spring bearing arm 6 is employed, being supported at its outer end at the non-vibratory periphery of
10 the diaphragm, and being adjustable by any suitable means, such as a cam 7, so as to exert a greater or less pressure upon the stylus arm with which it contacts, or over which it extends, and upon which it has a bearing, as
15 indicated in the drawings.

By giving the stylus arm, which at its attached outer end is in a plane substantially parallel with the surface of the diaphragm, an upward sweeping curve, it is possible to
20 position the stylus point at the desired angle with reference to the plane of the surface of the diaphragm, and hence, to the surface of the record or blank, so as to produce the best results, while the bearing point of the arm
25 starting back of the point of the graver or stylus point, extends forward and has its bearing upon the exact center of the diaphragm, and directly beneath the extremity of the stylus point. This insures the accurate
30 transmission of motion of the center of the diaphragm to the stylus point, and hence insures an accurate record. It has been found in practice that the relatively thick or heavy diaphragm instead of being less sensitive
35 to sound waves is more sensitive than the disks of smaller gage or less thickness, owing to the entirely unobstructed areas thereof, there being no attachment of any kind at any point on the surface of the diaphragm
40 within the area of its peripheral support, and the only object in contact with any portion of the surface of the diaphragm being the bearing point of the stylus which, as above indicated, is made of almost unappreciable area. The effect of this construction
45 is that the diaphragm, while responsive, to the most sensitive sound waves, does not prolong those waves and thus set up secondary or false vibrations which result in a false record. The rigidity of the diaphragm is such
50 that having received an impulse due to an impinging sound wave, it truthfully answers to the impulse and then returns to its normal position. It has been found that whispers
55 can be accurately recorded and as truthfully reproduced while concerted or orchestra work can be produced with accuracy and without the confusion due to harmonics, all of the more sensitive over tones being accurately
60 recorded, and as accurately reproduced.

In Fig. 4 has been shown a diagram of a diaphragm in which the stylus arm is secured on a radial line extending from the center to the periphery and indicating by the dark
65 broken lines the broken beats resulting from

a nodal condition due to the fact that the arm acts as a damper and interferes with the vibrations of that portion of the diaphragm. In that event the undamped portion or
70 half is not free to vibrate as when the diaphragm is entirely unsupported, for the reason that the condition of the damped portion of the diaphragm serves to obstruct the movement of all parts of the diaphragm.

In Fig. 5 is shown a diagram indicating the
75 effect of covering a portion of the surface of the disk at its center with an attaching device for the stylus, and indicating that not only is the portion of the disk thus covered rendered inert and dead so far as sound pro-
80 duction is concerned, but the effect thereof is that of a damper to interfere with the proper formation of the waves in the surrounding portion of the diaphragm.

Fig. 6 illustrates a diaphragm free to vi-
85 brate under normal conditions wherein the wave lines are perfectly concentric and extend from the center to the periphery of the diaphragm.

I claim:—

1. In a device of the class described; a rigid, peripherally supported and otherwise superficially unobstructed diaphragm, and a stylus having a bearing upon the center of the diaphragm circumscribed in area to sub-
95 stantially that of a geometric point, said diaphragm being of such thickness as to be undeflected to any appreciable extent from its normal diametric plane by the pressure necessary to maintain the bearing point of the
100 stylus in constant contact with the diaphragm.

2. In a device of the class described; a rigid, peripherally supported and otherwise superficially unobstructed diaphragm, and a
105 stylus in yielding contact but unattached to the center of the diaphragm, with the bearing circumscribed in area to that of a geometric point, the said diaphragm being of a thickness to resist deflection by the pressure
110 necessary to maintain the stylus in unbroken contact with the diaphragm.

3. In a device of the class described; a rigid, peripherally supported and otherwise superficially unobstructed diaphragm; a stylus
115 bearing upon the center of the diaphragm with the area of contact circumscribed to substantially that of a geometric point, the said diaphragm being of a thickness to resist deflection by the pressure necessary to maintain
120 the stylus in unbroken contact with the diaphragm, and a spring arm cooperating with the stylus to establish a yielding contact between the stylus bearing point and the diaphragm.

4. In a device of the class described; a peripherally supported and otherwise superficially unobstructed diaphragm, and a stylus in constant contact with but unattached
125 to the diaphragm at its center, with the area

of contact circumscribed to substantially that of a geometric point.

5 In a device of the class described; a peripherally supported and otherwise superficially unobstructed diaphragm; a stylus, and a bearing for the latter in constant contact with but unattached to the diaphragm at its center, said bearing being attached to the stylus back of the stylus point and having its point of contact with the diaphragm in a plane cutting the center of the latter and the graving point of the stylus, and the area of contact between the bearing point and the diaphragm closely approaching a geometric point.

10 15 6. In a device of the class described; a peripherally supported and otherwise superficially unobstructed diaphragm; a stylus arm having its supporting end substantially

parallel with the surface of the diaphragm 20 and curved away therefrom toward its graving point, and a bearing for the stylus arm having its contact with the diaphragm at the center thereof and of an area closely approaching a geometric point, the said bearing 25 being connected to the stylus arm between the graving end thereof and its supporting end and lying in a plane cutting the center of the diaphragm and the graving point of the stylus. 30

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

CHARLES L. CHISHOLM.

Witnesses:

T. E. HOYLE,

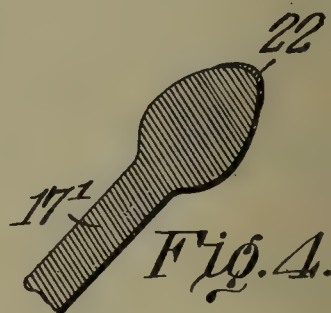
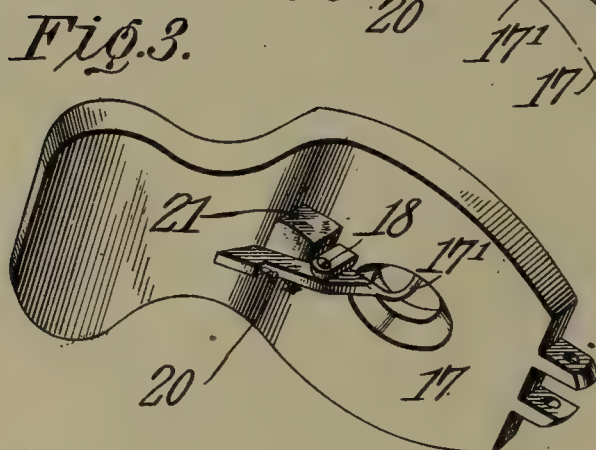
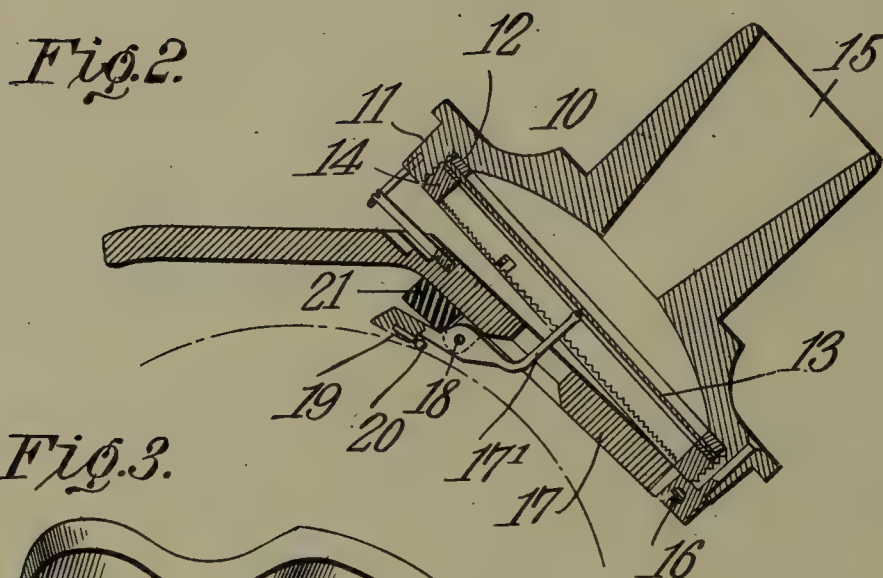
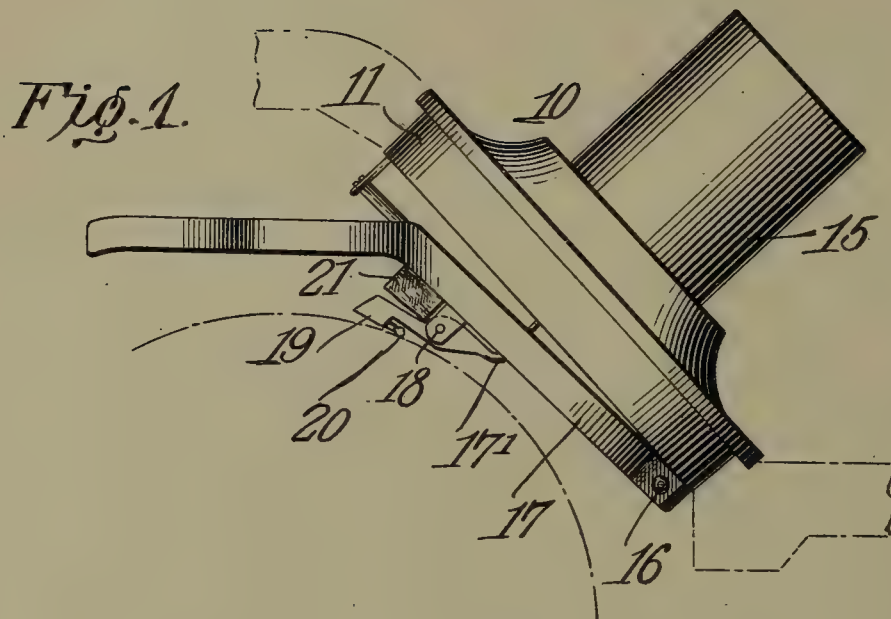
FRANK S. APPLEMAN.

No. 881,547.

PATENTED MAR. 10, 1908.

C. L. CHISHOLM.
REPRODUCER.

APPLICATION FILED APR. 22, 1907.



WITNESSES:

E. J. Stewart
C. Bradley

Charles L. Chisholm,
INVENTOR

By *C. A. Snow & Co.*
ATTORNEYS

UNITED STATES PATENT OFFICE.

CHARLES LOGAN CHISHOLM, OF MARYSVILLE, NEW BRUNSWICK, CANADA.

REPRODUCER.

No. 881,547.

Specification of Letters Patent.

Patented March 10, 1908.

Application filed April 22, 1907. Serial No. 369,607.

To all whom it may concern:

Be it known that I, CHARLES LOGAN CHISHOLM, a subject of the King of England, residing at Marysville, New Brunswick, Canada, have invented a new and useful Reproducer, of which the following is a specification.

The invention relates to talking machines particularly of the phonograph type, and more especially to reproducers, and the object in view is to provide a construction and arrangement of diaphragm and stylus whereby the sound waves or beats affect the diaphragm on truly concentric lines starting from the precise center of the diaphragm and the stylus receives an accurate vibration in accordance with the impressions on the record, and conveys them with the least resistance and a minimum number of parts directly to the diaphragm at its center to avoid false or secondary vibrations in the diaphragm due to untrue vibrations of the conveying means, the diaphragm being supported only at its periphery, being wholly unobstructed on both surfaces, and there being no attachment to the diaphragm of the means by which the vibrations of the stylus are conveyed thereto.

Further objects and advantages of the invention will appear in the following description, and it will be understood that various changes in the form, proportions, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawing:—Figure 1 is a side view of a reproducer constructed in accordance with the invention. Fig. 2 is a sectional view of the same. Fig. 3 is a detail view in perspective of the stylus arm applied in the operative position to the supporting plate. Fig. 4 is a detail sectional view of the contact end of the stylus arm showing the preferred embodiment of the invention.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

In the construction illustrated, the invention is shown applied to a reproducer of the Edison type, consisting of a sound box formed of a tube plate 10 having a flange 11, and an interior shoulder or seat 12 upon which the diaphragm 13 is arranged, and in contact with which it is firmly held at its periphery by the ring nut 14. The tube 15

which extends from the tube plate and communicates interiorly with the sound box is of the ordinary outwardly enlarged bore and is designed to be used in connection with a horn of any preferred construction. The sound box is hingedly connected at 16 with the counterbalance 17 and is adapted to be secured in any preferred or the usual manner to the frame of the machine, not illustrated.

The diaphragm within its supported periphery is wholly unobstructed as to both surfaces, and the impressions of the record are conveyed thereto by means of a stylus lever 17' which is pivotally mounted at 18 upon a bracket depending from the supporting plate and is provided with an arm 19 which terminates in a stylus or contact point 20, and while the arm is illustrated and is preferably constructed of very small diameter, it will be noted that from a point near the pivot to the contact point it is arranged almost entirely on a line perpendicular to that portion of the stylus lever which is between the pivot and the stylus point, and which may be termed the body portion of the structure, so that the lever while being light and sensitive is not strained in use on a transverse line, but on a substantially longitudinal line to avoid any tendency of flexing. Beneath the body portion of the stylus lever, and preferably close to the stylus point, is arranged a yielding cushion 21, which may be of soft rubber or any other resilient or spring material, or even a spring, adapted to yield under a very slight pressure and yet respond promptly to hold the stylus point in the desired contact and with the requisite stress against the record.

By this means the impressions of the record are conveyed directly to the contact point which is in contact with the diaphragm by a single member, so that there is no loss of vibration due to either lost motion or yielding or springing of the member itself, and in order to prevent any possible "screeching" between the contact point of the stylus lever and the diaphragm the said point of contact is provided with an interposed layer of some elastic or semi-elastic substance, indicated at 22. This cushion should be so thin as to have no appreciable damping effect and yet prevent screeching between the diaphragm and the stylus lever. The cushion is film-like in thinness and may be made of gutta percha or any other substance that will not stick to the diaphragm, and is ap-

plied to the end of the stylus lever so that the area of contact with the diaphragm amounts to but little more than a geometrical point. It has been found in practice
5 that by means of this single element which contacts with, but which is not attached in any way to the diaphragm, the sound waves are conveyed to the diaphragm with a faith-
10 fulness which results in an accurate reproduction without the setting up of those false vibrations which constitute the disadvantages of reproducers in which the connection
15 between the stylus lever or arm and the diaphragm includes a member attached to and sometimes through the diaphragm, so that the diaphragm is not only impelled in one
direction by a push applied to the stylus connections, but is also pulled so that the vibrations interfere with each other.

20 I claim:—

1. A reproducer having a peripherally supported but otherwise superficially unob-
structed diaphragm, and a stylus carrier un-
25 connected with the diaphragm but having a contact point provided with a film-like cushion in contact but not connected with the
surface of the diaphragm at the center.

2. A reproducer having a peripherally supported but otherwise superficially unob-
30 structed diaphragm, and a yieldingly-supported stylus carrier provided with a contact point provided with a film-like cushion which is in contact but not connected with
the surface of the diaphragm at its center.

3. A reproducer having a peripherally 35 supported but otherwise superficially unobstructed diaphragm, and a stylus carrier mounted for pivotal movement and having its extremity opposite to the stylus point constructed to form a contact point for con- 40
tact with the surface of the diaphragm at its center, and cushioning means under that portion of the stylus carrier which is adjacent to the stylus point.

4. A reproducer having a peripherally 45 supported but otherwise superficially unobstructed diaphragm, and a pivotal stylus carrier having a substantially non-damping, cushioned contact point for contact with the diaphragm at its center. 50

5. A reproducer having a peripherally supported but otherwise superficially unob-
structed diaphragm, and a pivotally mount-
ed stylus carrier terminating at one end in
a stylus point and at the other end in a con- 55
tact point, a cushion of film-like thinness on the contact point of the stylus carrier, and a cushioning device arranged in operative re-
lation with the stylus end of the stylus car-
rier to yieldingly impel the same toward the 60
record.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

CHARLES LOGAN CHISHOLM.

Witnesses:

E. B. EDWARDS,
LOUIS MADDRE.

No. 881,594.

PATENTED MAR. 10, 1908.

G. KÖNIGSTEIN.
TALKING MACHINE NEEDLE.
APPLICATION FILED SEPT. 20, 1907.

Fig. 1.

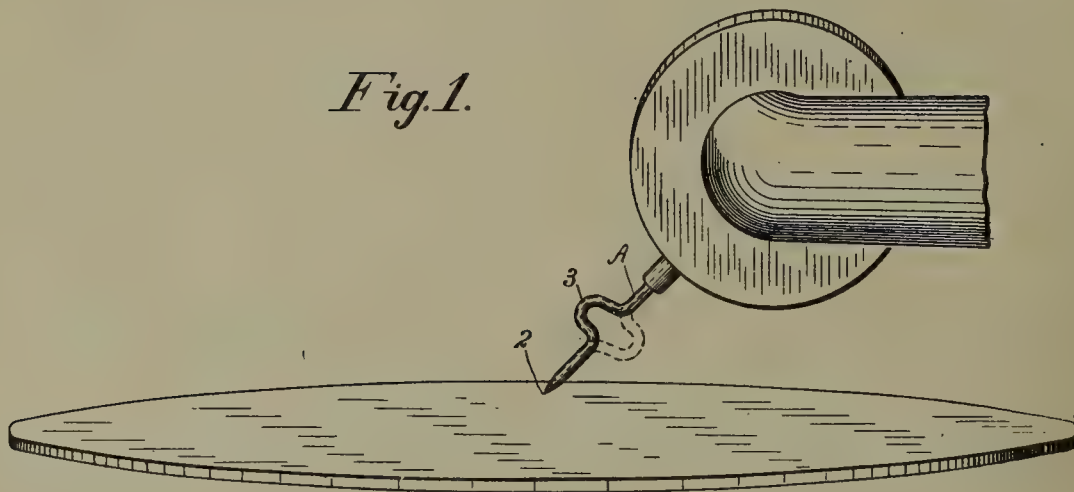
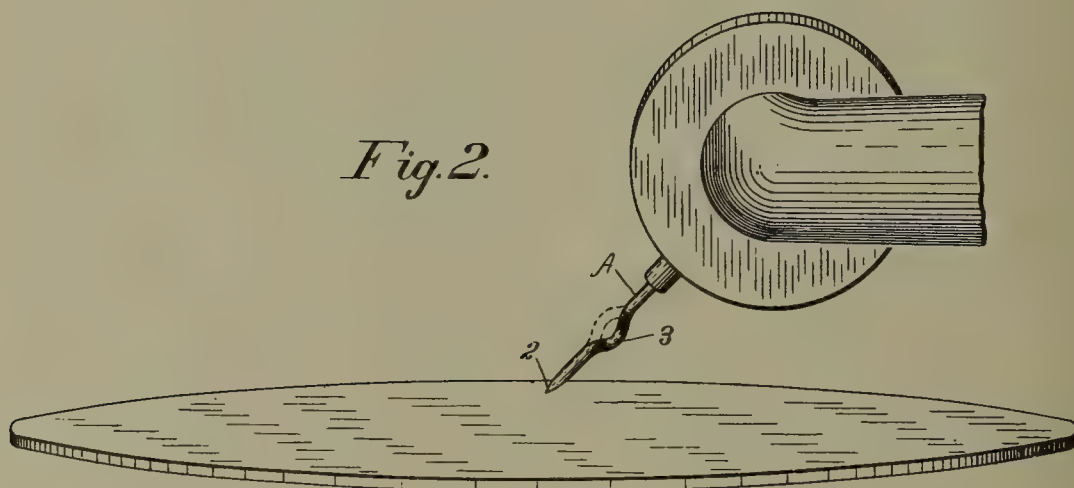


Fig. 2.



WITNESSES

Alar Currie
John H. Smith

INVENTOR

Gábor Königstein.
BY *Geo. H. Strong,*
ATTORNEY

UNITED STATES PATENT OFFICE.

GÁBOR KÖNIGSTEIN, OF SAN FRANCISCO, CALIFORNIA.

TALKING-MACHINE NEEDLE.

No. 881,594.

Specification of Letters Patent.

Patented March 10, 1908.

Application filed September 20, 1907. Serial No. 393,851.

To all whom it may concern:

Be it known that I, GÁBOR KÖNIGSTEIN, citizen of United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Talking-Machine Needles, of which the following is a specification.

My invention relates to talking machines, and especially to the needles through which the records upon the disks are transmitted through the remainder of the apparatus.

It consists in a novel form of the needle, so that by changing its position, a loud or soft tone may be transmitted.

Referring to the accompanying drawings for a more complete explanation of my invention—Figures 1 and 2 show different positions of the needle with relation to the disk.

In the transmission of audible sounds from disk talking machines, a steel needle is fixed to the diaphragm or sounder of the transmitter and the point of this needle rests upon the disk and follows the characteristic lines from which the audible sounds are transmitted.

Needles for this purpose have heretofore been made substantially straight, and so held with relation to the record disk that they were moved smoothly over it; but they are incapable of producing any changes in the tones to be transmitted.

In my invention the needle has a shank A which is adapted to be fixed in any suitable holder connected with the diaphragm and the transmitter, and the point 2 travels upon the record disk. Intermediate between the ends of the needle the shank is bent into a curve, as shown at 3. This curve may be made longer or shorter, and more or less abrupt in its bends, as shown in the drawings. When

a needle of this construction is fixed in the holder so that the bend projects transversely of the line of travel of the disk with relation to the needle, the tones produced thereby will be very much softened on account of the greater length and the elasticity of the needle; and the same effect will be produced whether the bend projects in one direction or the other, transversely of the travel.

If the needle is fixed in its clamp or holder so that the curve is in the line of travel of the disk, and with the bend presented in either direction, the tones will be made louder and stronger, and thus enabled to regulate the tones of the instrument to a degree, and produce such a tone as the character of the voice or music requires.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. A needle for a disk talking machine, said needle having a portion intermediate of its ends bent transversely beyond the plane of the outer sides of the needle to increase the length and elasticity thereof.

2. A needle for disk talking machines, having one end adapted to be fixed and connected with the transmitter, the other end pointed to follow the lines of the disk, and an intermediate bend which curves outwardly from the direct line of the first two portions of the needle.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GÁBOR KÖNIGSTEIN.

Witnesses:

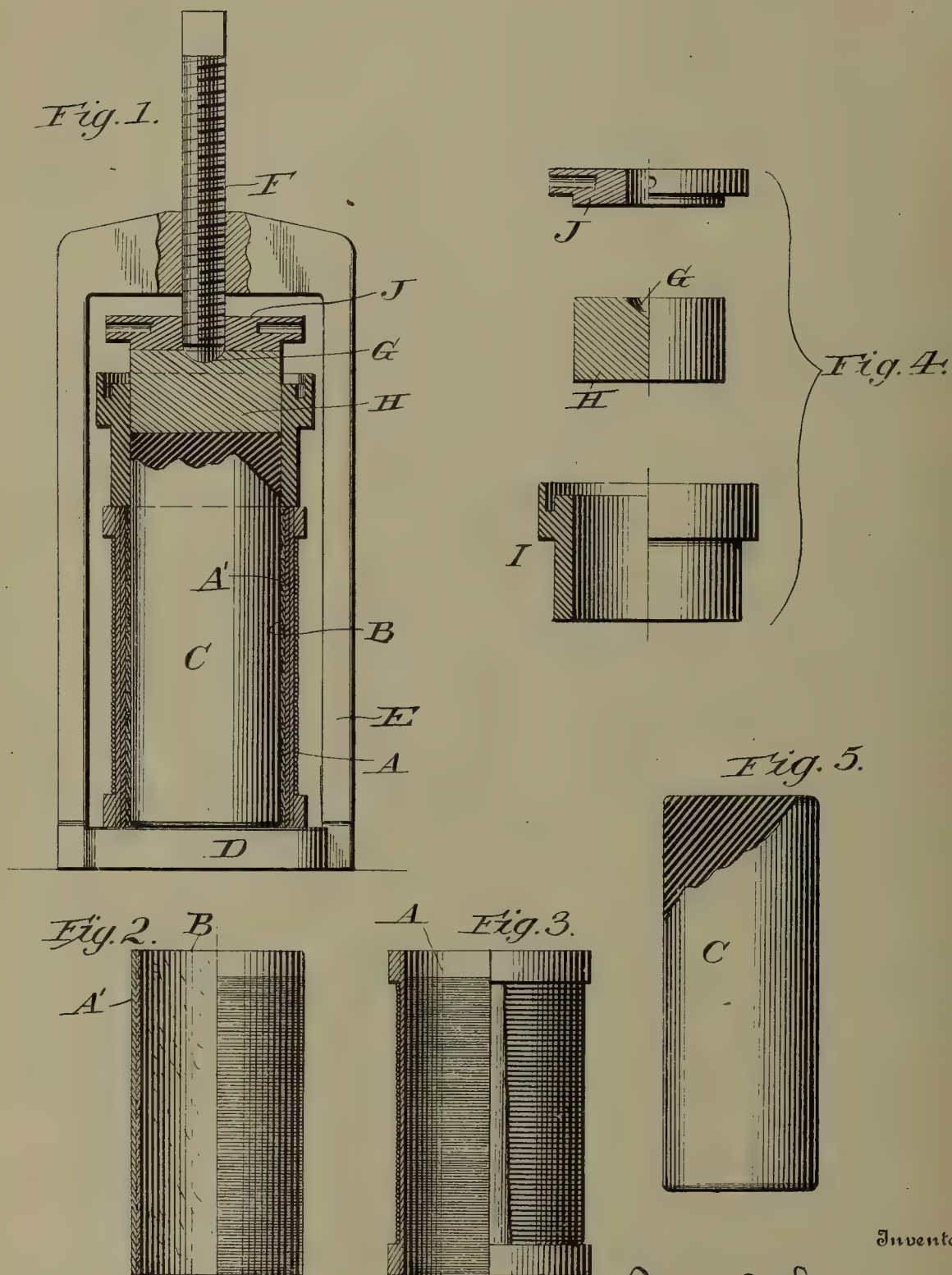
C. A. PENFIELD,
S. H. NOURSE.

No. 881,644.

PATENTED MAR. 10, 1908.

R. P. WINNE.
PROCESS OF MAKING PHONOGRAMS.

APPLICATION FILED DEC. 4, 1906.



Witnesses
Ch. Rader
J. Stewart Rice

By

Ritter P. Winne.
Dodge and Sons,
Attorney.

Inventor:

UNITED STATES PATENT OFFICE.

RITTER P. WINNE, OF BROOKLYN, NEW YORK.

PROCESS OF MAKING PHONOGRAMS.

No. 881,644.

Specification of Letters Patent.

Patented March 10, 1908.

Application filed December 4, 1906. Serial No. 346,299.

To all whom it may concern:

Be it known that I, RITTER P. WINNE, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Processes of Making Phonograms, of which the following is a specification.

My present invention pertains to an improved phonogram and method of making the same, as will be hereinafter set forth in detail, reference being had to the annexed drawings, wherein:

Figure 1 is a vertical sectional view of one form of apparatus employed in carrying out the process; Fig. 2, a sectional elevation of the completed phonogram or record; Fig. 3, a similar view of the matrix or mold; Fig. 4, sectional elevations of various members of the apparatus; and Fig. 5, a like view of the expanding member employed to force the outer face of the phonogram blank into contact with the matrix.

The main object of the invention is to produce a superior celluloid phonogram, and preferably one in which the backing member for the record surface is molded or given its required and finished form at the same time the record is impressed upon the record surface. With the process hereinafter set forth the record may be made relatively deep, which is a point of material advantage.

The phonogram in its preferred form may be said to comprise an outer face or record surface made of celluloid, and an inner cylindrical backing or body of pasteboard, which is molded to form in the process of manufacture.

In carrying out my process, I employ a cylindrical matrix or mold A having upon its inner face the reverse of the cord to be reproduced, such matrix being of the well-known form. Within the matrix is placed a cylinder A' of relatively thin celluloid, and when the backing is to be molded with the record surface, a cylinder or tube B of pasteboard, the tube making a somewhat neat or close fit with the celluloid cylinder. Before the pasteboard is placed in position it is softened by soaking it in water, or in a substance, such as a light paste or glue, which will soften its fibers and permit it to expand circumferentially without breaking.

Within the pasteboard tube is placed a cylindrical plug or block C of rubber, and the parts thus positioned are placed on end upon

a bed or base D from which extends a yoke or frame E carrying a screw F. Said screw at its lower end finds its bearing in a socket G formed in the upper face of a pressure-block H, which is seated upon the upper end of the expanding plug or rubber cylinder C, the block likewise extending into a sleeve or collar I which rests upon the matrix and surrounds the upper end of the rubber plug C which normally projects above the upper end of the matrix and its contained blank. A nut J is mounted on the lower end of the screw and is of service in securing the parts in their initial adjustment. When the parts are thus positioned, with the pasteboard backing member softened, heat to the requisite degree to soften the celluloid, is applied to the matrix and pressure exerted upon the block H by screw F, and through the block to the rubber plug or expanding member C. The expansion of the plug is equal in all directions and will force the confined pasteboard tube B directly against the now soft and plastic celluloid cylinder A', the outer face of the latter being forced against and into the matrix, and taking an impression therefrom. After the pressure and heat have been maintained a sufficient length of time to effectually reproduce the record upon the celluloid face, the parts are allowed to cool and the pressure is relieved. Upon the contraction of the parts, due to cooling, the celluloid surface will withdraw from contact with the matrix, and the phonogram with its backing or body, may be taken from the matrix. By reason of the fact that the backing is pressed or molded to form at the same time the relatively thin celluloid surface has the record impressed upon it, the record surface is evenly sustained and backed up throughout, and no shaping or dressing of the record is requisite. By using an expanding member of the same diameter throughout, an equal pressure is exerted upon the various portions of the softened backing and through it upon the celluloid body which forms the record surface.

It is evident that in so far as the apparatus for making the phonogram is concerned, any form may be employed so long as the cylindrical rubber expanding member is employed.

It is of course possible to form the record without the backing, in which case the cylindrical rubber expanding member comes into direct contact with the interior face of

the celluloid member. No claim is made herein to the phonogram *per se* as that is reserved for a future application, to be filed as a division hereof.

5 Having thus described my invention, what I claim is:

1. The process of forming phonograms, which consists in placing a cylinder of celluloid in a matrix; arranging a backing of softened pasteboard within the celluloid cylinder; softening the celluloid by the application of heat; and finally expanding the same together with the pasteboard backing to force the celluloid into intimate contact with the matrix.

2. The process of forming phonograms, which consists in placing a cylinder of celluloid within a matrix; backing said celluloid with a tube of softened pasteboard; applying heat to the celluloid to soften the same; and finally applying pressure throughout the entire inner surface of the pasteboard tube whereby it will be expanded laterally and thereby force the plastic celluloid into intimate contact with the matrix.

3. The process of forming phonograms, which consists in placing a hollow cylinder of

celluloid in a matrix; placing a cylindrical member of rubber within the celluloid member; heating the matrix and celluloid to a degree sufficient to soften the celluloid; and finally applying pressure to one end of the cylindrical member, the other member being held against a fixed abutment, whereby the cylindrical member will be spread or extended evenly throughout and the celluloid will be forced outwardly into intimate contact with the matrix.

4. The process of forming phonograms, which consists in placing a cylinder of celluloid in a matrix; arranging a backing of normally-unyielding material within said cylinder; softening the backing and the celluloid; and finally expanding the backing and the celluloid to force the latter into intimate contact with the matrix and the backing into a fixed relation with the celluloid.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

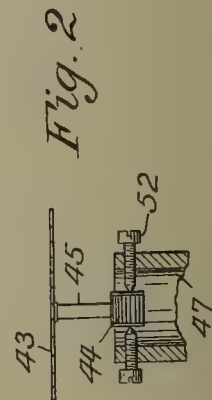
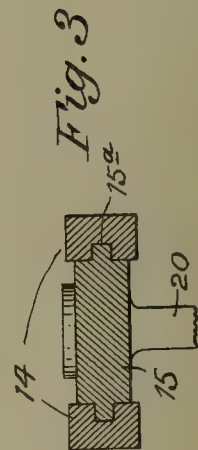
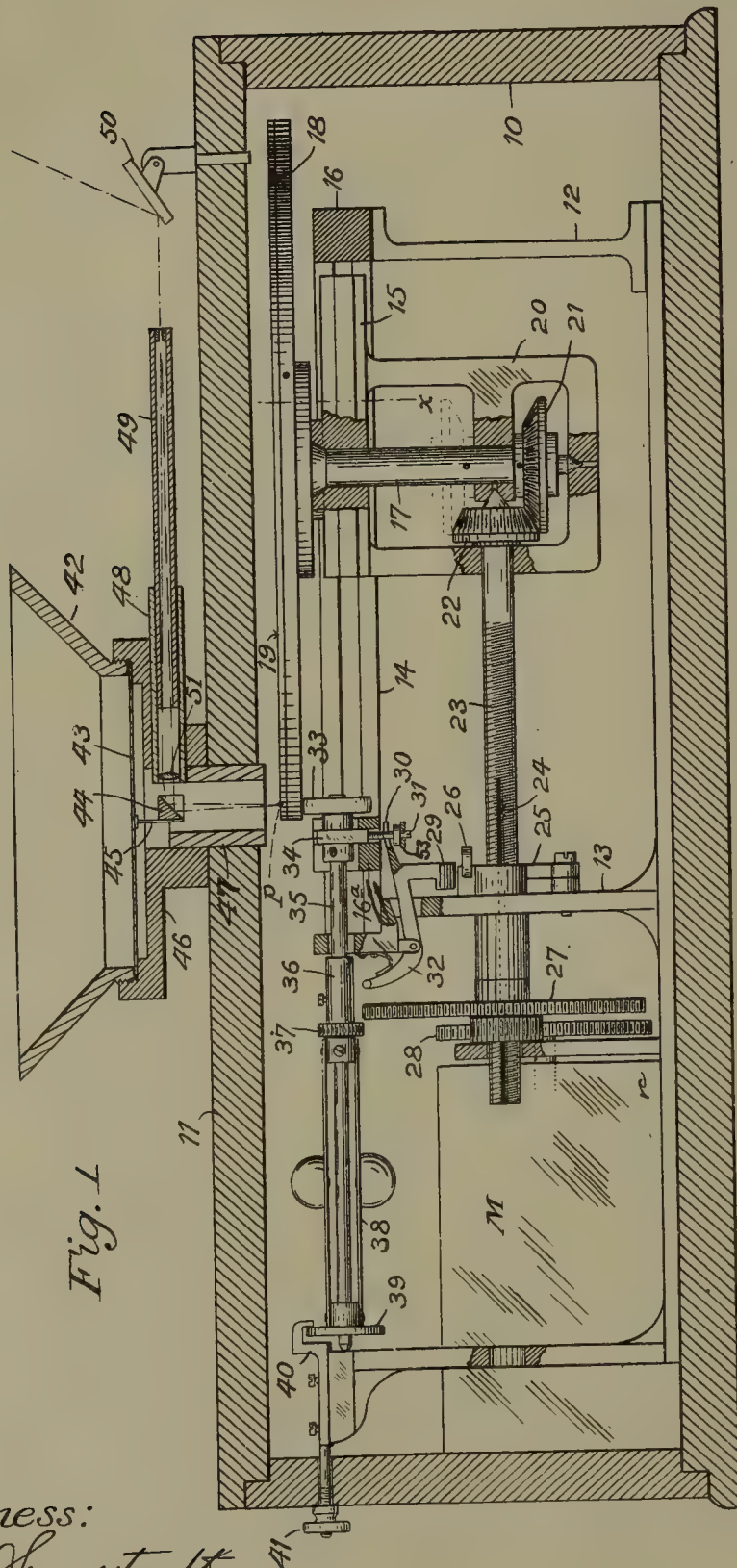
RITTER P. WINNE.

Witnesses:

EDWARD J. GALLAGHER,
A. G. TISDELL.

F. W. H. CLAY.
SOUND RECORDING APPARATUS.
APPLICATION FILED MAY 22, 1903.

2 SHEETS—SHEET 1.



Witness:
Paul Synnestvedt
Chas. E. Eberk

Inventor,
Francis W. H. Clay

F. W. H. CLAY
SOUND RECORDING APPARATUS.

APPLICATION FILED MAY 22, 1903.

2 SHEETS—SHEET 2.

Fig. 4

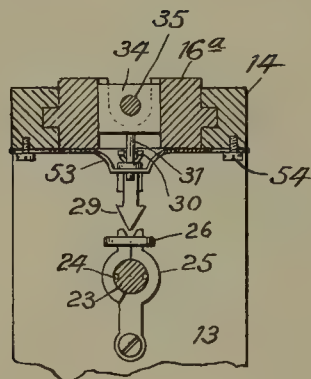


Fig. 5

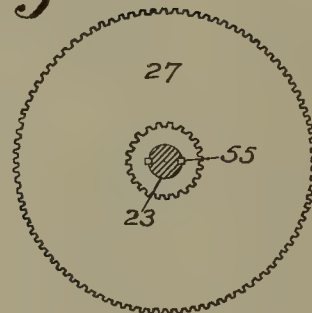


Fig. 6

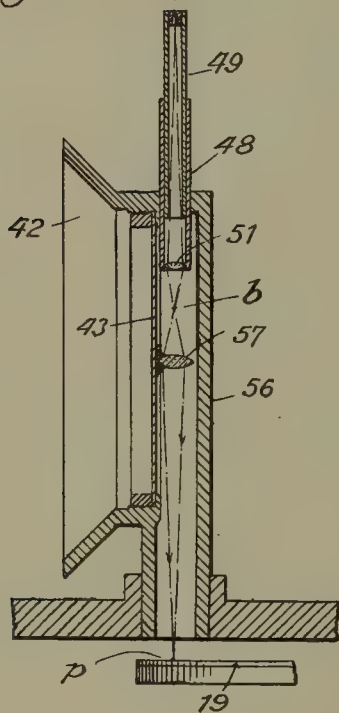
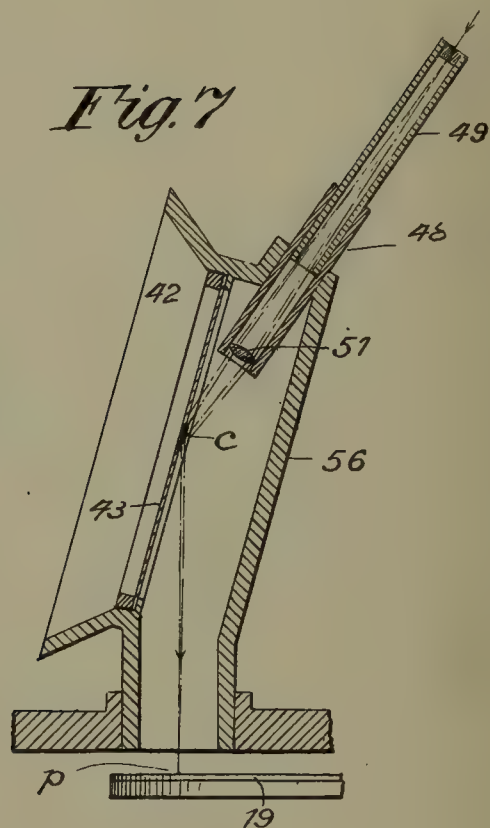


Fig. 7



Witness:
Paul Lynnestrectt
Chas. H. Eberk

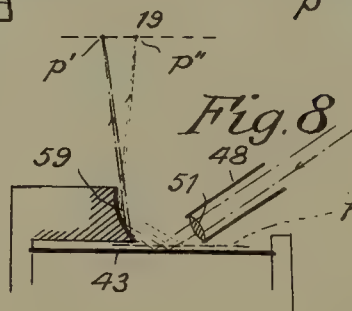


Fig. 8

Inventor,
Francis W. H. Clay

UNITED STATES PATENT OFFICE.

FRANCIS W. H. CLAY, OF PITTSBURG, PENNSYLVANIA.

SOUND-RECORDING APPARATUS.

No. 881,664.

Specification of Letters Patent.

Patented March 10, 1908.

Application filed May 22, 1903. Serial No. 158,311.

To all whom it may concern:

Be it known that I, FRANCIS W. H. CLAY, a citizen of the United States, residing at Pittsburg, in the State of Pennsylvania, have invented certain new and useful Sound-Recording Apparatus, of which the following is a specification.

My invention relates to the art of recording and reproducing sound vibrations, and is intended principally to carry out the process of photographically recording sound as set forth in my copending application for patent thereon, No. 47389, filed Feb. 15, 1901.

The objects of the invention are, to provide apparatus for vibrating a beam of light in strict consonance with the motions of a sound-actuated body and to cause the vibrating beam to traverse the surface of a sensitized film in a general spiral path so that the said beam of light traces an undulating path on the film; to provide a recording machine which is easily adjusted to rotate a plate either uniformly or so as to move it with varying velocity in order that the moving point under the impinging beam of light (or other recording means) may travel at an uniform speed under the said point, whatever the radius of motion thereon may be; to provide improved means for vibrating the beam of light; to provide an improved mechanical motion for the purposes; to easily and accurately adjust all the apparatus, and to generally improve the design and operation of a machine for the above purposes and others. Though the machine is particularly designed for recording, it is as well adapted to the function of actuating a record for reproduction.

The above objects, as well as other advantages which will hereinafter appear, I attain by the constructions and operation as illustrated in preferred forms in the accompanying drawings, wherein—

Figure 1 is a vertical longitudinal section through the camera, showing the machine therein partly in side elevation and partly in section, and the simplest form of the actuator for the light. Fig. 2 is a partial section through the tube containing the pivots for the reflector 44 in Fig. 1. Fig. 3 is a cross section through the carriage and guide bars of the table, taken along line *x* in Fig. 1. Fig. 4 is a vertical section through the regulator spindle and shifting screw, taken just in front of the bearing block 34 in Fig. 1,

showing also the split nut for the shifting screw etc. Fig. 5 is the elevation of the gear 27 in Fig. 1. Fig. 6 is a vertical section through a modified form of the means for actuating the beam of light, and its housing etc. Fig. 7 is a section of another modification of the light-vibrating means and its housing. Fig. 8 is a diagram illustrating another arrangement of reflectors for vibrating the beam of light, explained hereinafter.

In Fig. 1, the closed dark box 10 contains the frame 12, 13, which supports the horizontal guide bars 14, in which (Fig. 3) the sliding block 15, carrying the bearing frame 20, is mounted and moves to laterally shift the revolving table 18 on which is placed the recording plate 19. The ends of the guides 14 rest on the uprights 12 and 13 of the frame and are spaced apart by the blocks 16 and 16^a.

The recording table 18 is journaled in the block 15 and frame 20 and carries at its lower end the bevel gear 21 which meshes with bevel gear 22 fixed on the screw shaft 23. This latter works in the nut 25 pivoted on the frame 13 and slides freely through the hub of the gear wheel 27 but turns therewith by reason of the slot-and-feather engagement as shown in Fig. 5. The gear wheel 27 may be driven by gear 28 and this latter revolved by any desired means, as by a coiled spring in the motor box M. It will be seen that the revolution of the screw shaft 23 revolves the table 18 and at the same time, by progressing through the nut 25 the frame 20, block 15 and the table are caused to shift laterally.

In some cases it is desirable to move the table at a uniform rate of revolution; in this case the long hub 36 of the pinion 37 is inserted in the bearing shown to the right of it, when the pinion meshes with gear 27, the brush wheel 33 being then out of contact with the under side of the table 18 by reason of the bearing hole for the hub 36 being eccentrically placed with respect to the position of shaft 35 when the brush wheel is in contact. The pinion 37 is fixed by a set screw on the shaft 35 and this carries any desired regulator, as the common form 38 as shown: the friction disk 39 being in contact with hook 40 and this adjusted in position by the screw 41 from the outside, as will be plain from the drawing. I prefer however, for several reasons, to so move the recording surface that the point thereon which

is directly under the impinging point of the beam of light (p , Fig. 1), shall move always at a constant speed,—the table therefore varying its rate of revolution since the circumference of each lap of the spiral record line is different from any other. For this purpose I provide the brush or friction wheel 33 on the spindle 35; and in the position shown in the first figure it will be seen that the bearing block 34 for the end of the spindle has flanges (see Fig. 4), moving vertically in slots in the cross bar 16^a and is pressed upward so as to keep the wheel 33 in contact by means of a spring 53 resting on a shoulder on the adjusting screw 31. The regulator maintaining a constant rate of revolution of the wheel 33 and this latter being driven by the table 18, it is evident that the required motion is attained (it being of course understood that in this action the pinion 37 is out of mesh with gear 27).

The whole motion may be inverted to revolve the table in the opposite direction by placing the miter gear 21 in the position indicated in dotted lines in Fig. 1,—above the wheel 22.

In order to be able to readily shift the table laterally, I make the nut 25 in two parts, normally held together by the spring 26 (Fig. 4); this may be opened to release the shifting screw shaft 23 by insertion of the wedge 29 on the lever 32, which when pushed down against its retaining spring also removes the wheel 33 from contact with the table, by reason of the forked end 30 which embraces the screw shank 31 in the bearing block 34. A spring 53 serves to normally hold the wedge 29 out of engagement. A beam of light falling on a sensitized plate on the table, at the point p (Fig. 1) would thus trace a simple spiral line thereon. Or, a graving tool so placed would do the same on a surface of wax. In order to vibrate a beam of light in consonance with the waves in the air due to sound, I provide a disk or diaphragm 43 which may be mounted conveniently in a housing 46, 42. To this diaphragm near its center is attached a flexible strut 45 fixed or pivoted on the side of the reflector 44—(in this case a *camera lucida*), which is held in place to turn pivotally about the center of the reflecting surface by the points of the screws 52 (see Fig. 2), the housing of the glass part being extended around the same if desired. The light, striking the reflector 50 is directed into the telescope 49 through a small opening, and this latter slides in a casing 48 which has in its inner end a lens 51. The beam of light, converged through the lens strikes the reflector 44 and thence downward comes to a fine focus just at the surface of the sensitive film on the plate 19, at the point p ,—all as will be plain from the drawing.

The angular vibration of the reflector 44

causes an angular vibration of the impinging beam on the film radial to the table 18 and perpendicular to the direction of motion of the film under the point of incidence; the lateral linear motion of the point of incidence is the tangent of the angular motion of the beam, and of the reflector 44, but the angular motion of the reflector being the anti-tangent of the vertical linear motion of the strut 45 and the diaphragm 43, the vibration of the point of light on the film will evidently be in precise proportion to the motion of the sound-actuated diaphragm 43. It will also be seen that the amplitude of lateral vibration of the impinging point of the beam of light will depend simply on the relative lever arms of the beam and of the strut 45 about the pivoting points of the reflector 44,—that is it is variable at will by simply moving the lens, and the vertical height of the reflector above the table 18.

The actuator just described, while it is mathematically exact in its operation, has the disadvantage, in some cases, of introducing variable weight on the diaphragm 43. In order to overcome this, and to vibrate the recording point of light entirely free from any variation in the load on the diaphragm or in the resistance met in the motion, I provide the form in Fig. 6: On the diaphragm 43 is fixed a lens 57 in the path of the beam of light and arranged to converge the rays to a fine focus at the surface of film 19 at p . The housing 42, 56, has a telescope 48, 49, as before, but the rays through the lens 51 come to a focus at b behind lens 57. The point b is thus a fixed radiant point and the motion of lens 57 vibrates the beam in exact proportion to the anti-tangent of the diaphragm's motion; so that the lateral play of the point p , being the tangent of the same angle is the same in proportion. The weight on the diaphragm in this case is constant and the recording means mathematically exact at whatever amplitude we vibrate the beam.

In order to entirely obviate weight on the vibrating diaphragm the devices of Figs. 7 and 8 may be used. In the former case the converging rays from lens 51 fall at a very acute angle on the diaphragm 43 itself, and this is furnished with a fine reflecting spot c at its center. As the spot c moves across the rays of light it meets and reflects rays at different angles and thence reflects a beam on the film 19 at p in varying position, as will be clear to those familiar with the art. The amplitude varies with the distances from c to p , and to the lens.

In the diagram of Fig. 8, the rays from lens 51 strike the reflecting surface on the diaphragm 43 before focus, and thence they reflect to the curved reflector 59, which is made of a form to present a surface at different angles as the rays from 43 meet it at different points due to the vertical motion of

diaphragm 43. This gains a great exaggeration of the vibrations, without introducing any weight or other source of inaccuracy.

The operation will now be clear: A sensitized plate having been put on the table 18 in the dark and the machine started and the light let into the opening in telescope 49, the plate 19 is driven under the point *p* so that this latter's relative travel is spirally over the plate. The sound striking the diaphragm 43, angularly vibrates the beam of light, radially to the table, and thus the impinging point of light on the plate 19 traces a laterally undulating line, in a general spiral path over the plate, faithfully recording all sound waves affecting the diaphragm. The plate may then be developed as set forth in my co-pending application above referred to.

It will be understood that the machine itself, exclusive of the light-actuating means, may be used to reproduce from groove records, by turning the plate under the point *p* as before, and providing at this point a needle point attached to a diaphragm to vibrate it, as in the common gramophones.

Having thus described my invention and illustrated its use, what I claim and desire to secure by Letters Patent, is the following:

1. Apparatus for photographically recording sound comprising a reflector mounted to vibrate angularly on a diaphragm, means for directing a converging beam of light thereon, a sensitive film and means for moving it spirally under the focus point of the beam, substantially as described.

2. The combination with means for angularly vibrating a converging beam of light in consonance with the motions of a sound-actuated body, of a plate carrying a sensitized film thereon and means for moving the film in a general spiral path under the point of focus of the beam and recording the said trace of light thereon.

3. A sound recording camera comprising a dark box, a supporting table therein, means for directing a converging beam of light on the table, and means for revolving the table and simultaneously shifting it laterally, and means for vibrating the position of the beam of light in exact accordance with the movements of sound waves.

4. In a recording machine the combination with a photographic film and means to vibrate a beam of light in consonance with sound waves of a table supporting said film under the beam of light, mounted to revolve in a sliding carriage, a screw shaft and gears for both revolving the table and laterally shifting it, a friction wheel driven by the revolving table and a regulator controlling the revolution of the shaft of the friction wheel.

5. In a recording machine the combination with a means for vibrating a beam of light in consonance with sound waves, of a sensitive film and a table supporting the film

and means for revolving and laterally shifting it, and a regulator actuated by a friction wheel revolved by contact with the table whereby the movable point of contact of the table on the friction wheel travels at a regular speed.

6. In a recording machine the combination with a shifting and rotating table, of mechanism for rotating the table and speed regulating mechanism to maintain a constant speed of that point on the table which is momentarily opposite to a fixed point, a sound-actuated reflector and means to direct a reflected beam of light on said point, and a photo-sensitive film for recording the vibrations.

7. The combination with a rotating and laterally shifting table and means for driving it, of a governor for regulating the speed, driven by said table from a fixed position whereby the table moves its surface opposite to the fixed point at a constant speed, and means to vibrate a beam of light in consonance with sound waves over said point.

8. The combination of a rotating and laterally translating table, mechanism to drive the same and a differential governor driven by the surface of the table, and means to reflect and vibrate a sound-actuated beam of light on the table.

9. In sound recording apparatus the combination with mechanism for properly moving a recording surface, of a reflector, a sound diaphragm carrying means for angularly vibrating the reflector, and a telescope for directing a converging beam of light on the reflector.

10. In sound recording apparatus a pivotally mounted reflector, a sound diaphragm carrying means to actuate the reflector, a lens for throwing a converging beam of light on the reflector and means for recording the movements of the beam of light.

11. In sound recording apparatus the combination of a diaphragm, a telescope for converging a beam of light and means attached to the diaphragm for causing the focus point of the beam of light to move in exact harmony with the motions of the diaphragm.

12. In sound recording apparatus the combination of a sound diaphragm, a telescope and lens for converging a beam of light, means attached to the diaphragm to vibrate the beam of light synchronously with vibrations of the diaphragm and capable of adjusting the amplitude of vibration of the focus point of the beam of light without affecting the motions or load of the diaphragm.

13. In photographic recording apparatus the combination of a stationary lens for converging and directing a beam of light, a sound diaphragm and a fixed means on the diaphragm for angularly vibrating the beam of light with the linear vibrations of the diaphragm.

14. In photographic recording apparatus the combination of a vibrating body having a reflecting surface, a lens arranged to converge and direct on said surface a beam of
5 light at an acute angle, whereby the linear vibration of the body angularly vibrates the beam of light, for the purpose specified.

15. The combination of a sound diaphragm mounted in a closed housing, a reflecting
10 spot on the diaphragm, a lens to converge a beam of light and directing it on the dia-

phragm at an acute angle, the area of the reflecting spot being of a size to reflect only part of the rays of light in the beam, substantially as described.

15

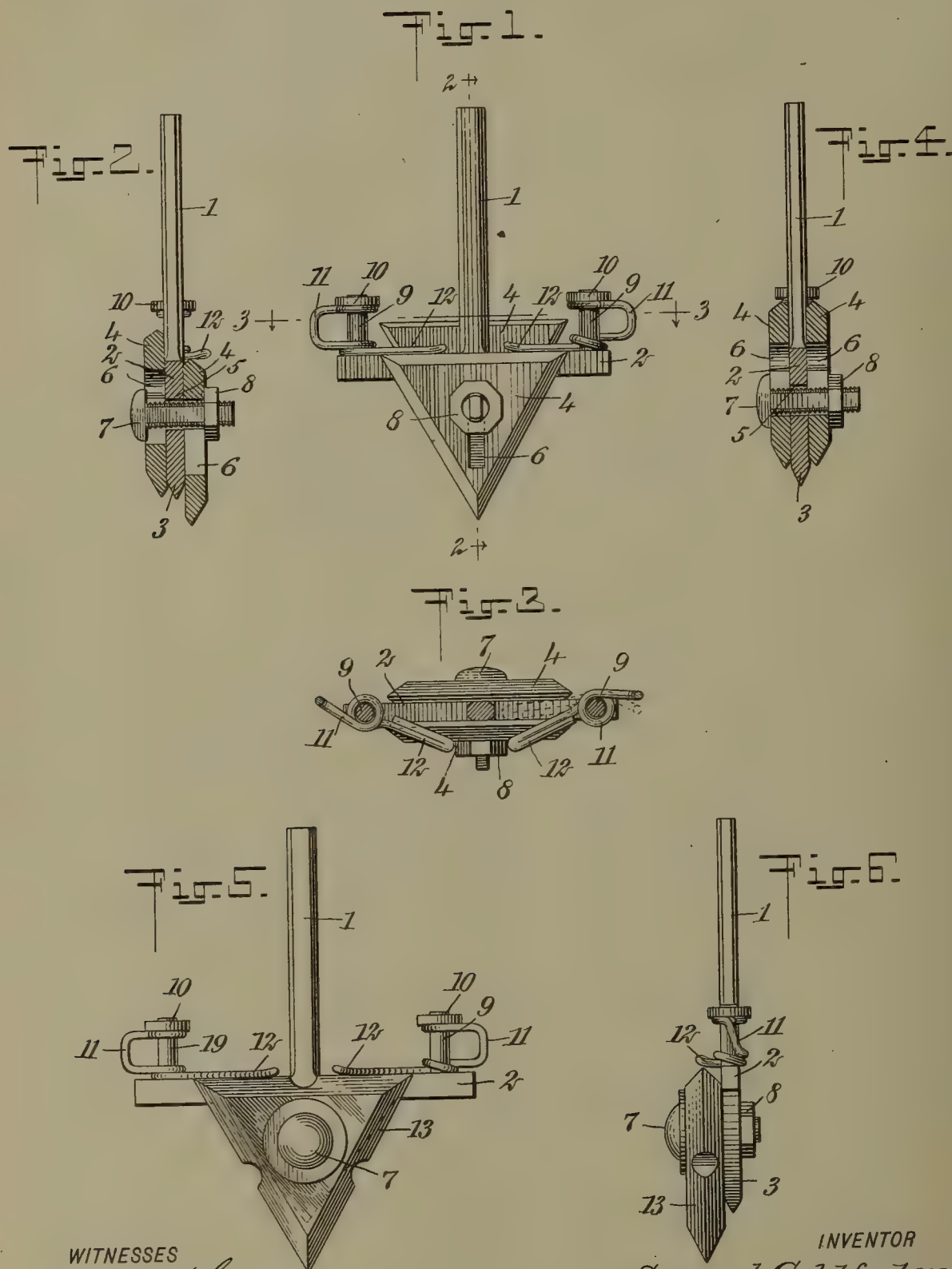
In testimony whereof I have hereunder signed my name in the presence of the two subscribed witnesses.

FRANCIS W. H. CLAY.

Witnesses:

PAUL SYNNESTVEDT,
CHAS. H. EBERT.

S. GOLDFADEN.
STYLUS FOR TALKING MACHINES.
APPLICATION FILED DEC. 9, 1907.



WITNESSES
E. B. Cheney
E. B. Marshall

INVENTOR
Samuel Goldfaden
BY *Mum Co*
ATTORNEYS

UNITED STATES PATENT OFFICE.

SAMUEL GOLDFADEN, OF NEW YORK, N. Y.

STYLUS FOR TALKING-MACHINES.

No. 881,792.

Specification of Letters Patent.

Patented March 10, 1908.

Application filed December 9, 1907. Serial No. 405,794.

To all whom it may concern:

Be it known that I, SAMUEL GOLDFADEN, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Stylus for Talking-Machines, of which the following is a full, clear, and exact description.

My invention relates to talking machines, and has for its object to provide a stylus which can be adjusted in numerous different ways so that it will always have a good point to trace the record, thereby actuating the diaphragm in such a manner that the sound waves produced will be even and the sounds harmonious and clear.

Another object is to provide auxiliary styli which are secured to the principal stylus, with means to secure one of the auxiliary styli in an operative position with one of its several points below the principal stylus.

Still another object is to provide means for rigidly securing the auxiliary styli to the principal stylus.

In this specification I will describe the preferred form of the invention but I do not limit myself thereto, as I consider myself entitled to all forms and embodiments of the invention which may be held to fall within the scope of the appended claims.

Similar reference characters refer to similar parts in all the figures, in which

Figure 1 is a front view of the stylus with one of the auxiliary styli secured with its point below the point of the principal stylus; Fig. 2 is a transverse sectional view on line 2—2 of Fig. 1; Fig. 3 is a sectional view on line 3—3 of Fig. 1; Fig. 4 is a sectional view similar to that shown in Fig. 2 but with the points of the auxiliary styli above the point of the principal stylus; Fig. 5 is a front view of a modification of the invention; and Fig. 6 is a side view of the same.

Referring to the drawings it will be seen that the shank 1 is that generally used and that it may be connected with the diaphragm of the talking machine in the customary manner. At the lower end of the shank there is a cross-bar 2 and below it a triangular principal stylus 3, having its point approximately in line with the axis of the shank

1. The auxiliary styli 4 are preferably two in number, one secured on either side of the principal stylus 3. There is a hole 5 in the principal stylus and vertical slots 6, in each of the auxiliary styli. A bolt 7 passes through the said slots in the auxiliary styli 4 and the hole in the principal stylus 3, and a nut 8 holds the auxiliary styli with reference to the principal stylus, in a predetermined position. It will be seen that by means of the slots 6 the auxiliary styli may be raised or may be lowered in accordance with the wishes of the operator. When one of the auxiliary styli is lowered, the bolt will be found to be approximately in the center of the auxiliary stylus which is triangular in form. It is, therefore, possible in this position to turn the auxiliary stylus 4 with the result that any of its three points may be brought in alinement with the axis of the shank 1.

The sides of the principal stylus 3 and of the auxiliary styli 4 are beveled, so that the angles formed by the sides will be pointed and will be adapted to travel in the groove of the record. At either end of the cross-bar 2, there is a standard 9, with a button 10 secured at its top. Wound around each of these standards 9, there is a spring 11 with an arm 12 projecting inwardly toward the shank. The spring is so wound that it has a tendency to press downwardly and it may be pushed toward either of the auxiliary styli 4, when it may be pushed thereover so that the auxiliary styli 4 will be held rigidly with reference to the principal stylus and the shank 1. This will prevent any lost motion between the auxiliary styli 4 and the shank 1.

In the modification shown in Fig. 5 I use a hard stone for the stylus, thereby making it unnecessary to provide for the several adjustments shown in the principal construction. In the modified form the stylus 13 is made of hard stone, triangular in form, with the edges beveled so that each of the three points may be used to trace the record. The triangular hard stone stylus is pivoted at its center to a body similar to the principal stylus in the principal construction, and it may be rotated, presenting any one of its three points in alinement with the shank 1, to be used on the record. The cross-bar 2 with

the standards 9, and the springs 11 with their arms 12, are the same as shown in the principal construction and are used in the same manner.

5 In the use of the invention, the auxiliary styli are secured with their points above the point of the principal stylus 3, and the point of the principal stylus 3 is used to trace the record. The stylus may trace the
10 record with either face forward or with either of its sides in a forward position. When the point of the principal stylus has been worn, one of the auxiliary styli is pushed down so that its point is below the
15 point of the principal stylus. This point may be used to trace the record with each of its four different sides in a forward position and when this point is roughened the auxiliary stylus may be rotated on the bolt
20 7 and another point be used in the same manner. When all the points of one auxiliary stylus have been worn, it may be pushed upwardly and its companion auxiliary stylus be used.

25 Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A stylus for talking machines, having a plurality of points adapted to trace the record, means to adjust the stylus so that one
30 point is substituted for another, and means which bears on the periphery of the stylus and thereby holds rigid the point which is in operative position.

35 2. A stylus for talking machines, having a plurality of points, a body having a shank adapted to be connected to the diaphragm of the talking machine, the stylus being pivoted to the said body, and means which
40 bears on the periphery of the stylus to secure it in a predetermined position.

3. A stylus for talking machines, having a plurality of points spaced apart on its periphery, a body having a shank adapted to be
45 connected to the diaphragm of the talking machine, the stylus being pivoted to the said body, and means which bears on the periphery of the stylus to secure it in a predetermined position.

50 4. A stylus for talking machines, having a plurality of points spaced apart on its periphery, a body having a shank adapted to be connected to the diaphragm of the talking machine, the stylus being pivoted to the said
55 body, means to secure the stylus against the said body, and means which bears on the periphery of the stylus and holds it rigid.

5. A stylus for talking machines, having a plurality of points, a body having a shank adapted to be connected to the diaphragm of the talking machine, a slot in the stylus means to pivot the stylus to the said body in
60 a plurality of positions along the said slot, and means to secure the stylus rigidly to the said body.

6. A stylus for talking machines, having a plurality of quite distant points in substantially the same plane, a body having a shank adapted to be connected to the diaphragm of the talking machine, a slot in the stylus
70 through which it is pivoted to the said body, and means bearing on the periphery of the stylus which secures it rigidly to the said body.

7. A stylus for talking machines, having a plurality of edges at angles to each other, said edges being beveled to form sharp points at the apexes of the said angles.

8. A stylus for talking machines, having a plurality of points, a body having a shank adapted to be connected to the diaphragm of the talking machine, the said stylus being pivoted on a bolt secured to the said body, and a spring by means of which the stylus
85 may be held rigidly relative to the said body.

9. A stylus for talking machines, having a body with a hole therein, a plurality of styli, each having a slot therein, and a bolt which passes through the hole in the body and the slots in the styli, by means of which they are
90 secured together.

10. A stylus for talking machines, having a body with a hole therein, a plurality of styli each having a slot therein, a bolt which passes through the hole in the body and the slots in the styli, by means of which they are
95 secured together, and springs on the body which are adapted to press on the styli and hold them rigidly.

11. A stylus for talking machines, having a body with a hole therein, a plurality of styli, a plurality of points on each of the said styli, each stylus having a slot therein, a bolt which passes through the hole in the body and the slots in the styli by means of which they are all secured together, and means to hold the styli rigid relative to the
100 said body.

12. A stylus for talking machines having a plurality of points, a body having a shank adapted to be connected to the diaphragm of the talking machine, the stylus engaging the body, means to adjust the stylus so that one point can be substituted for another, and means which bear on the periphery of the
105 stylus to hold it rigid.

13. A stylus for talking machines, a shank connected therewith, and means to bear on the stylus at a distance from the shank to hold it rigid.

14. A stylus for talking machines, triangular in form with its edges beveled to form sharp points at the apexes of the angles.

15. A stylus for talking machines, triangular in form with its edges beveled to form sharp points at the apexes of the angles, a shank adapted to be connected to the diaphragm of the talking machine, the shank engaging the stylus, and means bearing on the stylus to hold it rigid.

16. A stylus for talking machines, a shank adapted to be connected to the diaphragm of the talking machine, a body having a cross-bar means for securing the stylus to the
5 body, and a spring on the cross-bar adapted to bear on the periphery of the stylus.

17. A stylus for talking machines, a shank adapted to be connected to the diaphragm of the talking machine, the body having a
10 cross-bar, means for securing the stylus to

the body, and springs one on either end of the cross-bar, the springs bearing at different points on the periphery of the stylus.

In testimony whereof I have signed my name to this specification in the presence of 15 two subscribing witnesses.

SAMUEL GOLDFADEN.

Witnesses:

BENJAMIN P. FATARSKY,
EVERARD B. MARSHALL.

R. B. SMITH.
SOUND REPRODUCER.
APPLICATION FILED SEPT. 17, 1907.

Fig. 1.

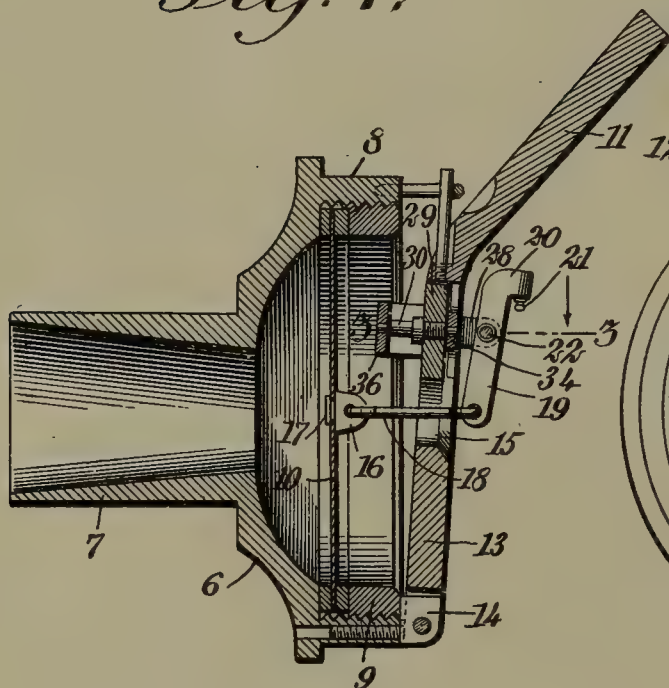


Fig. 2.

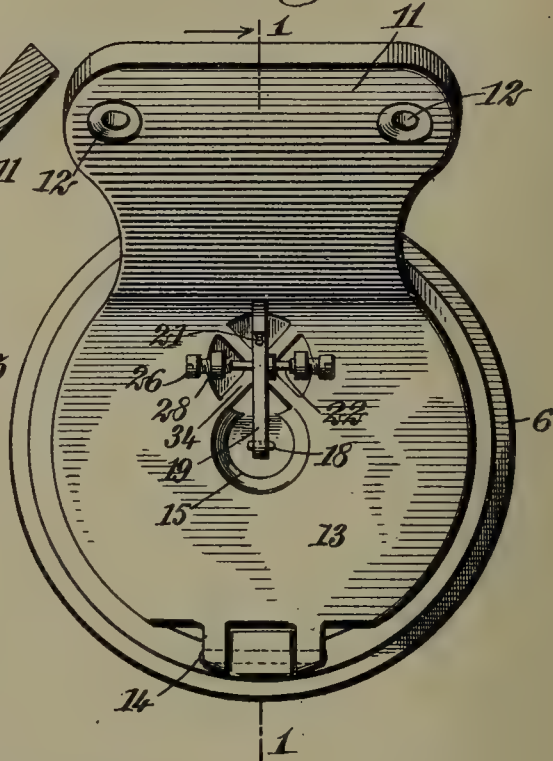


Fig. 4.

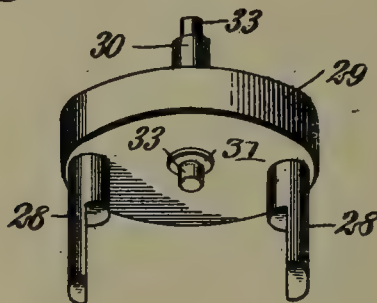


Fig. 3.

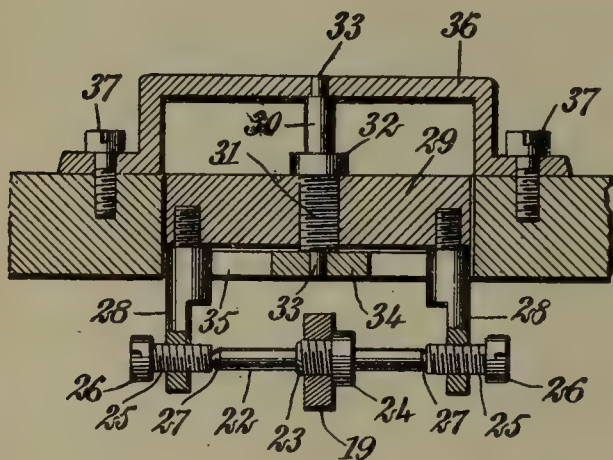
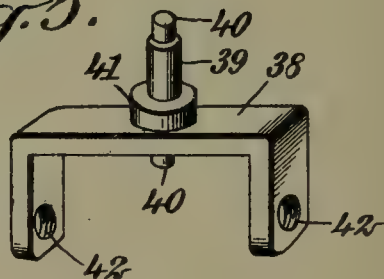


Fig. 5.



WITNESSES

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Walton Harrison

INVENTOR

Richard B. Smith

BY Mum Co

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UNITED STATES PATENT OFFICE.

RICHARD BARTHOLOMEW SMITH, OF NEW YORK, N. Y.

SOUND-REPRODUCER.

No. 881,831.

Specification of Letters Patent.

Patented March 10, 1908.

Application filed September 17, 1907. Serial No. 393,309.

To all whom it may concern:

Be it known that I, RICHARD BARTHOLOMEW SMITH, a subject of the King of Great Britain, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Sound-Reproducer, of which the following is a full, clear, and exact description.

My invention relates to reproducers, such, for instance, as are employed in connection with talking machines, my more particular object being to provide for greater freedom of movement of the stylus lever in order to permit a more faithful reproduction of the vibrations and to avoid undue wear upon the record and stylus.

More particularly stated, my invention relates to means for permitting the stylus lever to travel freely in a direction lateral to the general direction of travel of the diaphragm.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a central vertical section on the line 1—1 of Fig. 2, through a reproducer of the so-called "Edison type," equipped with my invention, this view showing the diaphragm, the stylus lever for actuating the same, and the means employed for allowing the stylus lever to turn or rock in a direction approximately parallel to the diaphragm; Fig. 2 is a rear elevation of the reproducer, showing how the stylus lever is mounted upon the rocking disk by aid of a staff pivotally mounted upon the rocking disk; Fig. 3 is an enlarged central section on the line 3—3 of Fig. 1, through the rocking disk, showing more particularly how the staff is supported thereupon and how the stylus lever is connected with the staff; Fig. 4 is a perspective showing one form of swivel carrier for supporting the stylus lever; Fig. 5 is a perspective showing a different form of swivel carrier for supporting the stylus lever.

The reproducer casing is shown at 6 and is provided with a sleeve 7 to which the phonograph horn may be connected. The casing is provided with an annular portion 8 threaded internally and mounted within it is a ring 9 threaded externally. A diaphragm 10 is mounted within the casing 6 and is free to vibrate. A weight 11, having the form of a plate, is provided with the usual holes 12

whereby it may be partially supported, if desired, by aid of a ribbon or string, when the apparatus is not in use. A plate 13, integral with this weight 11 and forming a continuation thereof, is connected with the casing 6 at the bottom thereof by aid of a hinge 14, and the plate 13 is provided centrally with an aperture 15. Mounted upon the diaphragm 10 is a cross head 16 which is engaged by a connecting link 18, and the latter extends through the aperture 15 and engages the lower end of a stylus lever 19. The upper end of this stylus lever is provided with a lug 20 which supports a jewel or glass stylus 21 for engaging the record cylinder. A staff 22 supports the stylus lever 19, and for this purpose a cylindrical screw 23 is fitted tightly upon the staff 22, being preferably shrunken thereto so as to avoid the possibility of its becoming detached. This cylindrical screw is provided with an annular head 24 which jams squarely against the stylus lever 19. The screw extends directly through the body of said lever.

The staff 22 is supported by screws 25, the inner ends of which are cupped for the purpose. These screws are provided with heads 26 whereby they may be turned, and are so arranged that the cups upon the inner ends of the screws fit upon the ends of the staff 22 which are made conical at 27 for this purpose. By turning the screws 26 the play of the staff 22 may be regulated at will and the general position occupied by the stylus lever 19, relatively to the center of the diaphragm, may be controlled as desired.

Supporting the screws 25 are two stems 28 each screwed into a rocking disk 29. This rocking disk is mounted upon a stub shaft 30, the latter being provided with a threaded cylindrical portion 21 extending directly through the rocking disk. Mounted upon the stub shaft 30 is an enlarged portion 32 constituting a head for the threaded portion 31. The stub shaft 30 is provided at its ends with reduced bearing portions 33. One of these reduced bearing portions extends through a spider 34 integral with the plate 13. This spider is formed by cutting away the plate 34 so as to leave arcuate slots 35.

A bridge 36 is mounted upon the plate 13 and secured thereto by aid of screws 37. This bridge engages one of the reduced portions 33 of the stub shaft 30 and forms a bearing therefor. The bridge 36 and the spider 34 being rigid relatively to each other,

and the rocking disk 29 being normally rigid in relation to the stub shaft 30, it follows that the rocking disk 29 turns upon the reduced bearing portions 33 which are supported by the bridge 36 and spider 34.

The arrangement above described allows great freedom of movement of the stylus lever 19, this lever being free to turn in practically any direction occasionally required, and being especially free to turn in a direction corresponding to a plane lateral to the general direction of vibration of the diaphragm 10.

In the form shown in Fig. 5, the U-shaped bracket 38 takes the place of the rocking disk 29. A stub shaft 39 is provided with reduced ends 40 and with an enlarged annular portion 41, the latter engaging directly the surface of the U-shaped bracket. Threaded holes 42 are provided in the U-shaped bracket for accommodating the screws 25, as will be understood by contrasting Fig. 5 with Fig. 3.

One purpose in increasing the greater freedom of movement allowed to the stylus lever, is to enable the vibratory impulses to be faithfully transmitted to the diaphragm in order that the diaphragm may in turn faithfully reproduce said impulses. Another purpose is to allow the stylus to follow irregularities in the record surface, without the possibility of mutilating either the stylus or the record surface, and also without permitting such irregularities to reproduce a false sound. The mounting above described for the stylus lever 19 is practically that of a universal joint or of a swivel.

It will be noted that the pivotal mounting for the stylus lever 19 is disposed in a line which, at one point, coincides with the axial line upon which the disk 29 turns. Such being the case the rocking of the disk 29 and of the stylus lever 19 does not change the position of the imaginary line around which the stylus lever 19 turns as a center when it rocks in a plane substantially parallel with the general plane occupied by the plate 13 so that this line always coincides with the imaginary line upon which the disk rocks as a center.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. The combination of a member mounted free to rock upon an axis, and a stylus lever supported upon said member and free to rock upon an axis intersected by a prolongation of the axis of said member, and a diaphragm in operative relation to said stylus lever.

2. The combination of a member mounted free to rock upon an axis, and a longitudinal

stylus lever pivoted upon said member and free to rock, said lever extending diametrically across the axis of said member, and a diaphragm in operative relation to said stylus lever.

3. The combination of a casing, a vibratory diaphragm mounted therein, a weight disposed adjacent to said casing and movable relatively thereto, a rocking member mounted upon said weight and free to turn relatively to the same in a plane nearly parallel with the plane of said diaphragm, and a stylus lever free to rock in a general direction crossing the plane of said diaphragm, the axis of said stylus lever being intersected by a prolongation of the axis of said rocking member.

4. The combination of a vibratory diaphragm, means for supporting the same, a weight disposed adjacent to said diaphragm and free to move independently thereof, a disk mounted upon said weight and free to turn relatively thereto in a plane nearly parallel with the plane of said diaphragm, and a stylus lever journaled upon said disk and free to rock in a general direction crossing the plane of said diaphragm, the axis of said stylus lever being intersected by a prolongation of the axis of said disk.

5. The combination of a supporting member mounted to rock upon an axis, a stylus lever mounted upon said supporting member and free to rock upon an axis, said lever being so positioned that the axis is intersected by a prolongation of the axis of said supporting member, a vibratory diaphragm, and a connection from said vibratory diaphragm to said stylus lever.

6. The combination of a vibratory diaphragm, means for supporting the same, a weight having substantially the form of a flat plate disposed adjacent to said diaphragm and pivotally mounted, said plate being provided with a recess, a rocking disk mounted within said recess and adapted to move in a plane parallel with said plate, the center of said rocking disk being disposed above the center of said diaphragm, a stylus lever journaled upon said rocking disk and adapted to rock in a plane crossing the general plane occupied by said rocking disk, the axis of said stylus lever being intersected by a prolongation of the axis of said rocking disk, and a connection from said stylus lever to said diaphragm.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RICHARD BARTHOLOMEW SMITH.

Witnesses:

WALTON HARRISON,
EVERARD B. MARSHALL.

No. 881,843.

PATENTED MAR. 10, 1908.

C. A. BEPPLER.
PHONOGRAPH HORN.
APPLICATION FILED MAY 13, 1907.

2 SHEETS—SHEET 1.

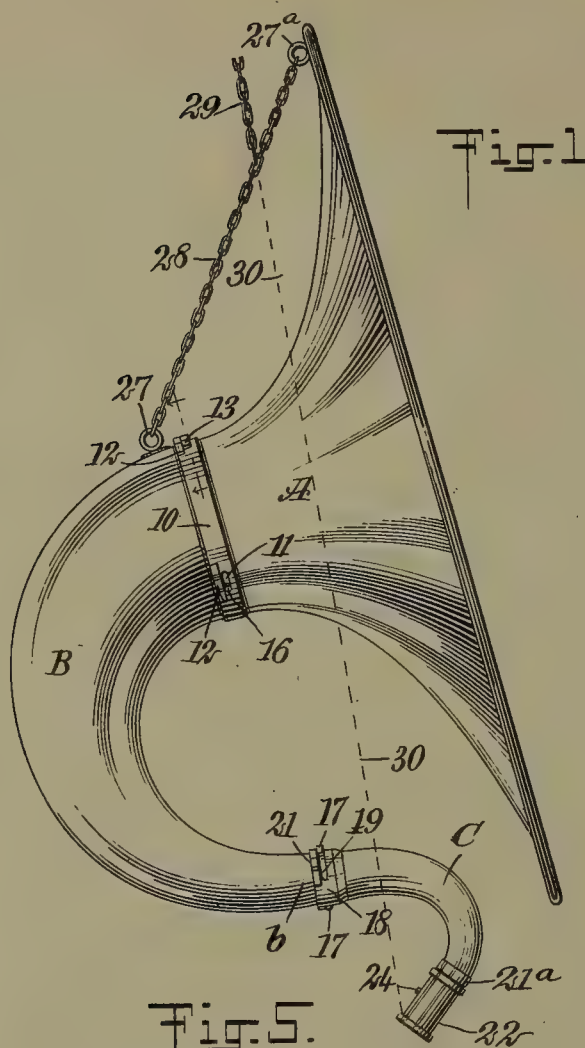


Fig. 5.

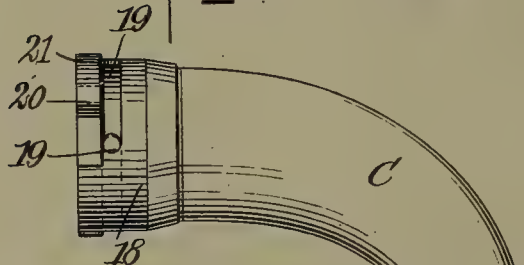
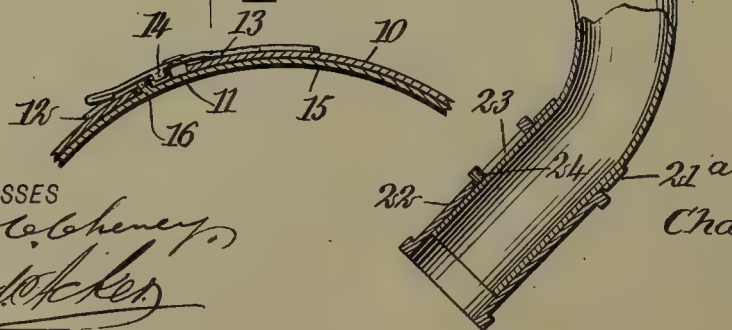


Fig. 6.

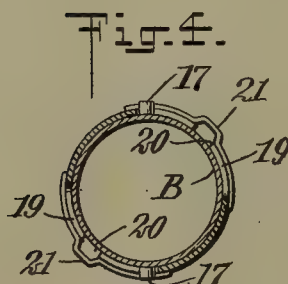
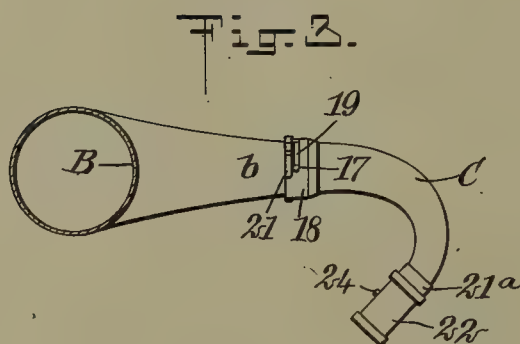
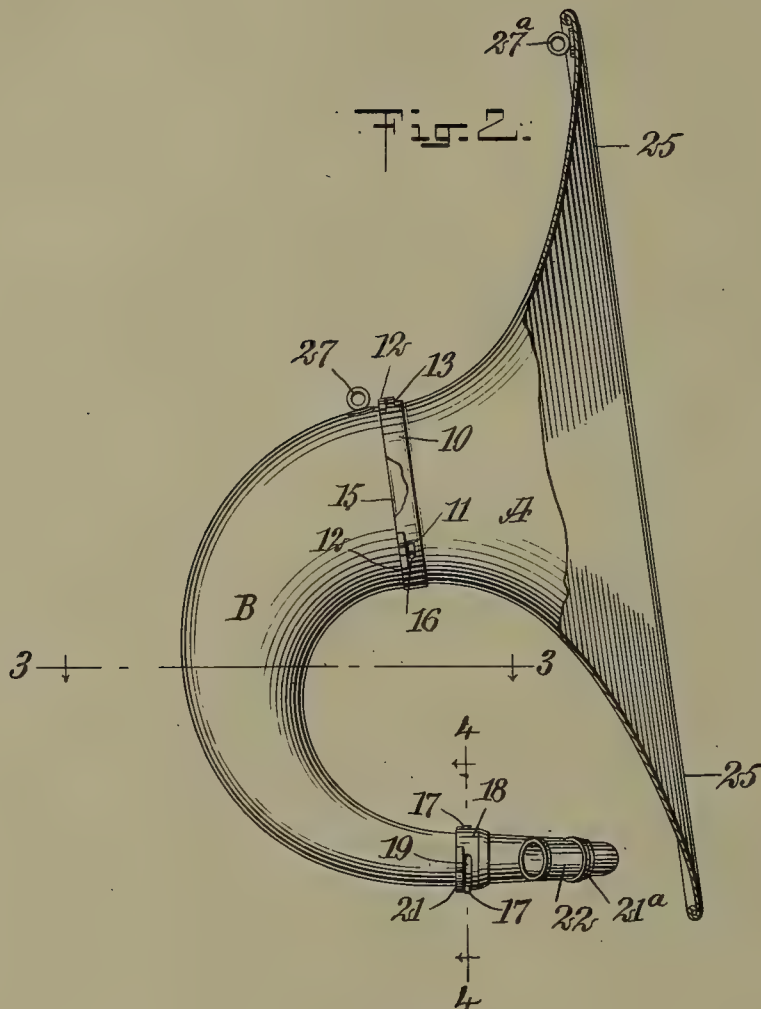


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ATTORNEYS

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PHONOGRAPH HORN.
APPLICATION FILED MAY 13, 1907.

2 SHEETS—SHEET 2.



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Charles A. Beppler

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BY *Mumford*
ATTORNEYS

UNITED STATES PATENT OFFICE.

CHARLES ANTON BEPLER, OF NEW YORK, N. Y.

PHONOGRAPH-HORN.

No. 881,843.

Specification of Letters Patent.

Patented March 10, 1908.

Application filed May 13, 1907. Serial No. 373,311.

To all whom it may concern:

Be it known that I, CHARLES ANTON BEPLER, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Phonograph-Horns, of which the following is a full, clear, and exact description.

10 The purpose of the invention is to so construct a phonograph horn that the tip can be adjusted with equal facility to either a disk or a cylinder record without changing the position of the body or the bell of the horn.

15 Another purpose of the invention is to render the horn compact in use, it having an S-shape or is formed upon the lines of a compound curve, whereby to bring the tip below yet not in contact with the flaring portion of the bell, and also to construct the horn in three separable parts, namely, a bell section, a body section, and a tip section, in order that the horn may be stored in a minimum of space.

25 Another purpose of the invention is to render the tip section not only detachable but adjustable and to provide said tip section with a sliding ferrule member capable of being moved to and from the record, and further, to so construct the bell section that the surface at and adjacent its outer marginal portion will be substantially flat or of cymbal formation, whereby to distribute the sound over a maximum of space.

35 The invention consists in the novel construction and combination of the several parts as will be hereinafter fully set forth and pointed out in the claims.

40 Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

45 Figure 1 is a side elevation of the improved horn having its tip set for use in connection with the cylinder record; Fig. 2 is a sectional side elevation of the horn showing its tip set for use in connection with the disk record; Fig. 3 is a horizontal section taken practically on the line 3—3 of Fig. 2; Fig. 4 is a vertical section taken substantially on the line 4—4 of Fig. 2; Fig. 5 is an enlarged sectional side elevation of the tip section of the horn; and Fig. 6 is a detail section through a portion of the receiving end of the bell and en-

tering end of the body, illustrating the application of a latch device thereto.

The horn consists of a bell section A, a body section B, and a tip section C. The contracted rear end of the bell section A is provided with a plain outwardly offset band 10, and in the said band 10 a series of substantially L-shaped slots 11 is produced, the slots being usually three in number, the longer sections of the said slots constituting their circumferential sections and their shorter or mouth sections are diametrical sections, and extend through the outer edge of the band 10.

Each slot 11 is spanned at its mouth portion by an outwardly arched or yoke shaped bridge 12, and a spring latch 13 is secured to the outer face of the band 10 at the forward side, or what would preferably be the uppermost slot 11, crossing the said slot just forward of the bridge or yoke 12 for said slot, and near the free end of this latch 13 a head 14 is provided, which head normally extends down into the longer or circumferential portion of the said uppermost slot at a point opposite the mouth of the said slot, and the under face of this projection or head 14 is preferably more or less beveled.

The body section B is longitudinally tapering, its upper end being of the greatest diameter and its lower end of the least diameter. At the upper end of the body section B a band 15 is formed, capable of sliding engagement with the inner face of the offset band 10 on the bell section A, and the band 15 on the body section B is provided with a series of pins 16 corresponding in number to the number of slots in the band member 10 on the bell. In connecting the body section B with the bell section A, the pins are made to enter the slots 11 at their mouth portions, passing beneath the bridges 12 at such point, and when the pins are forward of the said bridges and are in the longer members of the said slots, the body section is then turned to the outer ends of the said longer portions of the slots 11, whereupon the head 14 of the latch 13 will automatically drop behind the uppermost pin and prevent it from moving in its slot, thus locking the body section to the bell section in a removable manner.

The body section B in addition to being longitudinally tapering is given a downward and a forward curvature, the curvature being preferably more pronounced, as is shown, so

that the lower end of the said body section will be well within the plane of the outer edge of the bell section at its bottom portion, since when the body section is fixed to the bell section a line drawn through the center of one would pass through the center of the other.

At the lower reduced end portion *b* of the body section B usually two opposing pins 17 are exteriorly secured, and these pins are adapted for use in attaching to the body section B a tip section C. This tip section is likewise longitudinally tapering, being of greater diameter at its upper or inner end and of least diameter at its lower or outer end. The tip section C is reversely curved to the curvature of the body section B, the curve being in direction of the rear of the horn, and the said tip section C is not only removably connected with the body section B but is also adjustably connected therewith.

To that end at the upper extremity of the tip section C, a hub 18 is formed, as is illustrated best in Fig. 5, and this hub is adapted to receive within it the reduced lower end of the body section B, and the said hub 18 is provided with opposing circumferential slots 19, which as illustrated in Fig. 4 preferably correspond in length to the quarter of the circumference of the said tip section at its reduced end, and each slot 19 is provided with an entering or mouth section 20 at its central portion extending out through the edge of the hub 18.

When the tip section is to be placed upon the body section, the pins 17 of the body section are received in the slots 19 of the tip section, passing beneath arched members 21, that constitute bridges for the mouth portions of the said slots, and when the pins 17 are forward of these bridge members 21, the tip C is turned so as to bring the pins 17 in engagement with corresponding end portions of the slots 19, whereupon the tip C will have a downwardly extending or substantially vertical position, shown in Fig. 1, which position it occupies when the horn is to be used in connection with the cylinder record.

If the horn is to be used in connection with a disk record, the tip C is turned so as to bring the pins 17 of the body B in engagement with the other end portions of the slots 19 in the tip, whereupon the lower end of the tip will be carried in to the horizontal position shown in Fig. 2, bringing its outlet to face the disk. It will be observed that in either position of the tip C it is to the rear of the bottom outer portion of the bell of the horn, quite close thereto but separated a convenient distance therefrom, so as to render the device when its parts are connected exceedingly compact, and when the parts of the device are separated it can be packed in a very small compass.

Usually adjacent the lower end of the tip C

an exterior band or boss 21^a is formed, as is particularly shown in Fig. 5, and a ferrule 22 is mounted to slide upon the exterior of the tip at a point below the band or boss 21^a, and this ferrule 22 is provided with a longitudinal slot 23 through which a pin 24 extends from the said tip, as is also best shown in Fig. 5, which ferrule enables the tip to be lengthened or shortened to accommodate it to the record cylinders or record disks of different styles of phonographs.

The outer face of the flaring portion of the bell section A at its outer edge and at a part closely adjacent thereto, is provided with a flattened surface 25, so as to give to this portion of the bell the shape of the striking face of cymbals, and such formation tends to distribute the sound to a much greater degree than when the said bell is of an ordinary gradual curvature from its inner portion to its outer edge.

I do not limit myself to the exact construction herein shown and described, as the details of the invention may be modified or changed without departing from the spirit thereof. The ferrule 22 is particularly designed to prevent the horn leaving the speaker of instruments of the cylinder type after the machine is set in motion, as it adjusts itself to the speaker. Eyes 27 and 27^a are secured to the upper portion of the bell A at the outer marginal portion and to the body B, and said eyes are connected by a length of chain 28 having connected therewith a shorter stretch 29 that is connected with the usual stand, whereby the horn is capable of a free rotary swinging movement, since there is no coupling between the horn and the speaker, the horn being simply supported over the speaker independent thereof. The suspension chain 29 is in a line with the lower end of the tip C, as is shown by the broken line 30, so that in hanging the horn the tendency of the ferrule end of the tip will be to remain over the speaker. In practice, the bell of the horn occupies a more upright position than is illustrated.

Having thus described my invention, I claim as new and desire to secure by Letters Patent, —

1. A phonograph horn comprising a bell section, a body section removably connected at one end with the rear end portion of the bell section, means for locking the said sections together, a tip section having both removable and adjustable connection with the other end of the body section, and a sliding ferrule mounted upon the end portion of the tip section.

2. A phonograph horn formed on the line of a compound curve and comprising a bell section, a downwardly and forwardly curved body section, a tip section curved reversely to the curvature of the body section, the same being in direction of the rear of the

horn, and means for removably connecting the body section to the bell section and for removably and adjustably connecting the tip section with the body section.

5 3. A phonograph horn comprising a bell section having its outer face at the peripheral portion of its flaring section flattened, a body section removably connected with the rear end portion of the bell section, the body section being downwardly and forwardly curved terminating at its lower end at a point beneath yet within the horizontal plane of the lower edge of the flaring portion of the bell section, a tip section for the body section
10 curved reversely to the curvature of the body section, and means for adjustably and removably connecting the tip section to the body section.

4. A phonograph horn comprising a bell section having its outer face at the peripheral portion of its flaring section flattened, a body section removably connected with the rear end portion of the bell section, the body section being downwardly and forwardly curved, terminating at its lower end at a point beneath yet within the horizontal plane of the lower edge of the flaring portion of the bell section, a tip section for the body section, curved reversely to the curvature of the body section, means for adjustably and removably connecting the tip section to the body section, and a sliding ferrule mounted upon the lower end portion of the tip section.

5. In a phonograph horn, the combination
35 with a bell section having a series of L-shaped slots at its rear or contracted end, a body section having pins at its upper or enlarged ends adapted to enter the slots in the bell section, arched bridge members located
40 at the mouth portions of the said grooves, and a latch for one of the said pins, carried by the body section and having a head extending down into one of the said grooves, the body section being downwardly and for-

wardly curved, and also being of a longitudinally tapering shape in a downward direction, a tip section curved reversely to the curvature of the body section, opposing pins exteriorly located at the lower end of the body section, a hub formed at the upper or
50 inner end of the tip section, the said hub being provided with opposing slots of equal length and mouth portions at the central portions of the said slots, the slots being adapted to receive the said pins, a bridge
55 crossing the mouth portions of the slots of the tip member, and an adjustable ferrule at the lower end of said tip member.

6. A phonograph horn comprising a bell section, a body section removably connected
60 with the rear end portion of the bell section, the body section being downwardly and forwardly curved, a tip section for the body section curved reversely to the curvature of the body section, means for adjustably and
65 removably connecting the tip section to the body section, and a sliding ferrule mounted upon the end portion of the tip section.

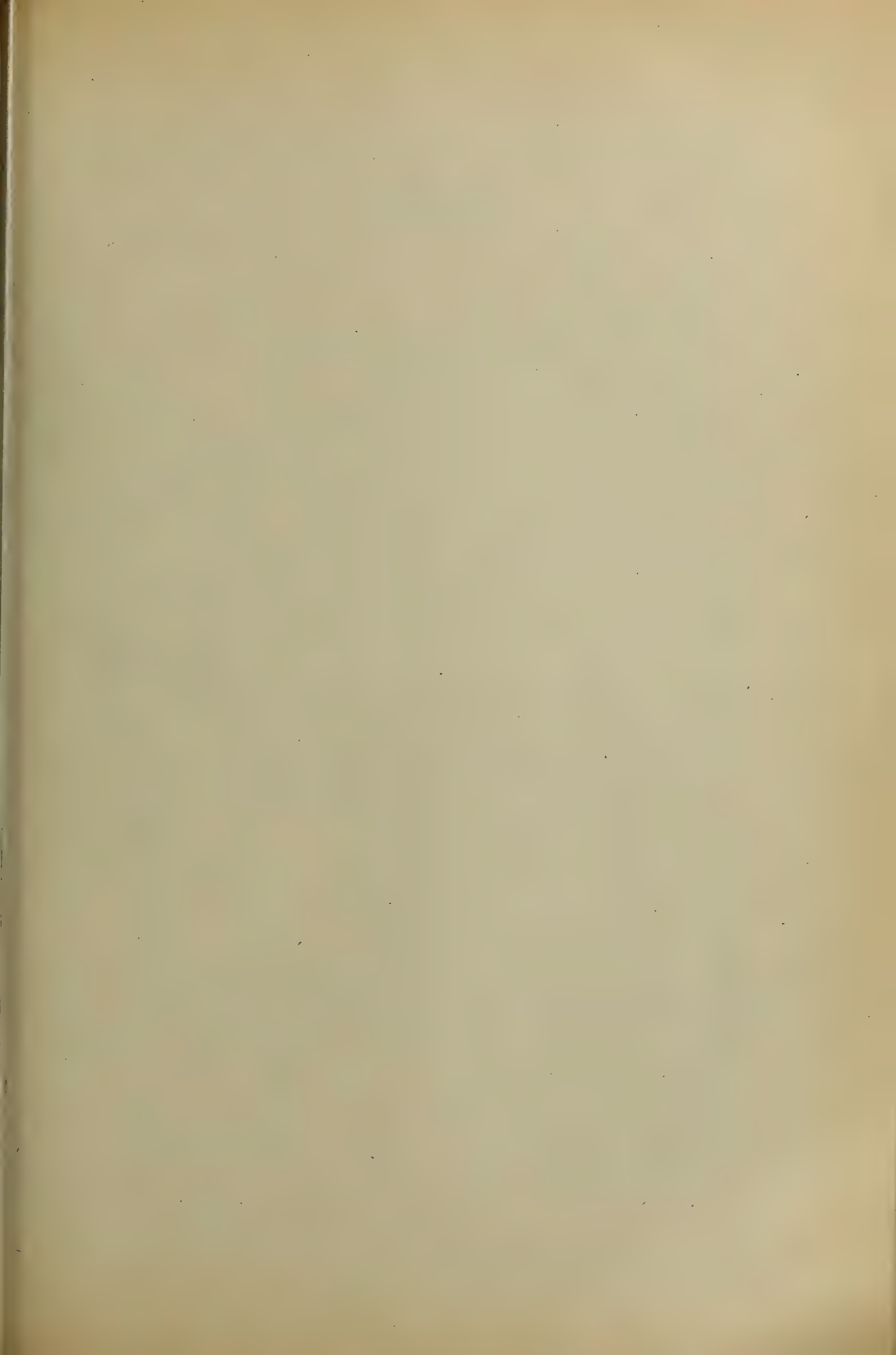
7. A phonograph horn comprising a bell section having an offset band at its rear or
70 contracted end provided with a series of substantially L-shaped slots, a body section having a band at its upper end capable of sliding engagement with the offset band on the bell section, the band on the body section being
75 provided with a series of pins adapted to enter said slots, a latch secured to the offset hand of the bell section for locking the body section in place, and a tip section having removable and adjustable connection with
80 the body section.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES ANTON BEPPLER

Witnesses:

ADOLPH HACHTMANN,
HARRY WALLER.



No. 882,785.

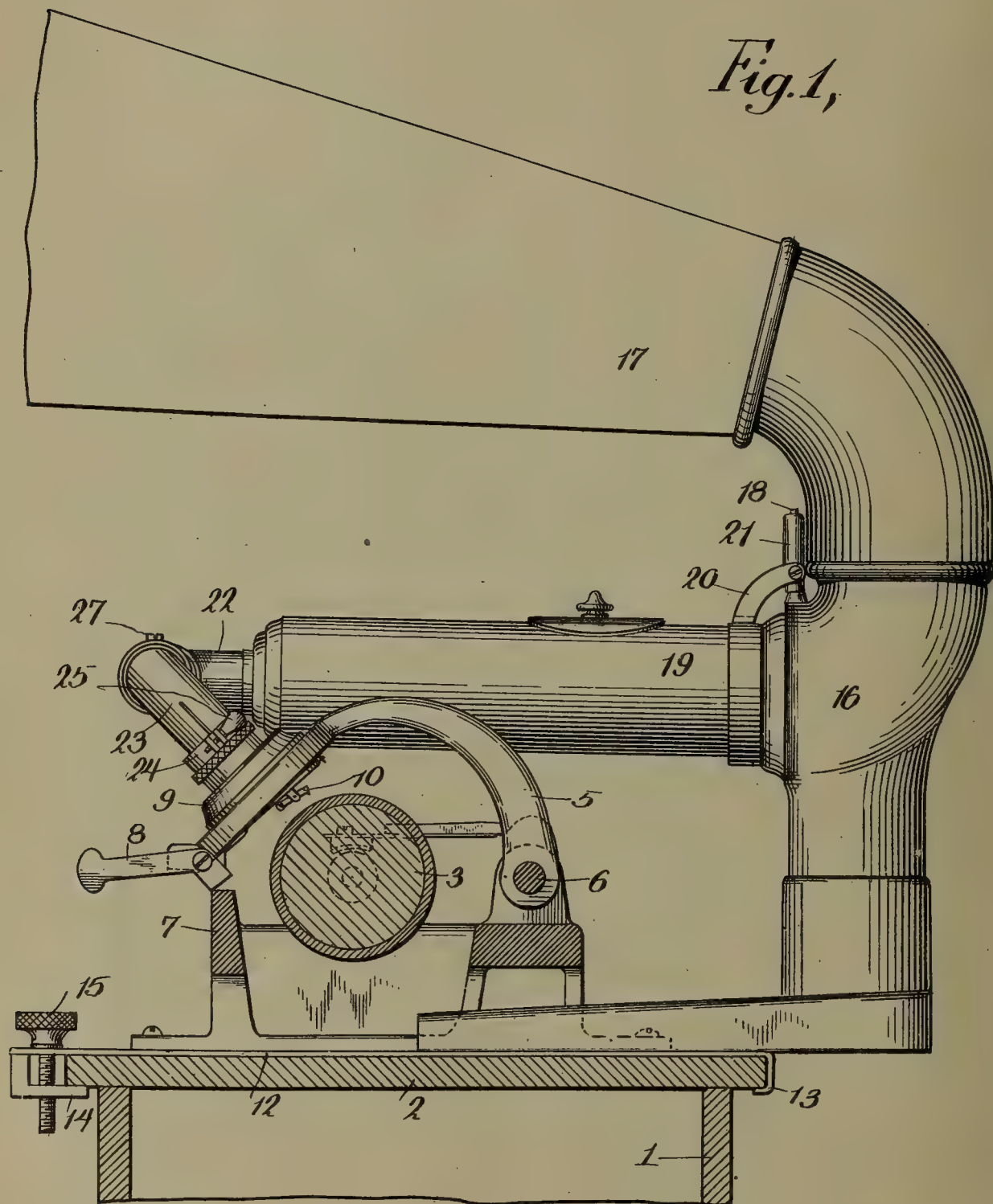
PATENTED MAR. 24, 1908.

T. KRAEMER.
TALKING MACHINE.

APPLICATION FILED OCT. 7, 1907.

2 SHEETS—SHEET 1.

Fig. 1,



WITNESSES:

W. Edwards
J. Mc Intosh.

INVENTOR

INVENTOR
Thomas Kneen
BY
J. P. Edmunds
ATTORNEY

T. KRAEMER.
TALKING MACHINE.
APPLICATION FILED OCT. 7, 1907.

2 SHEETS—SHEET 2.

Fig. 2,

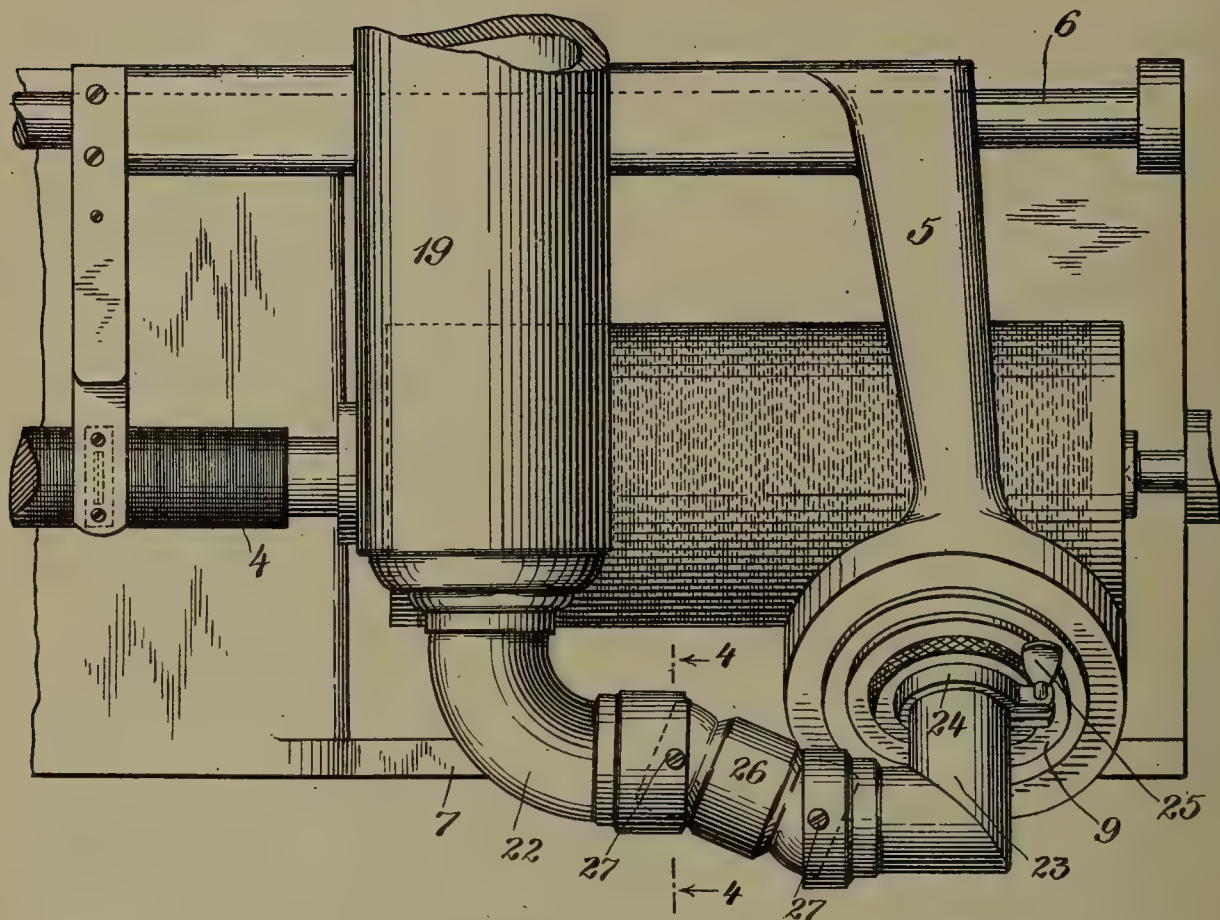


Fig. 3,

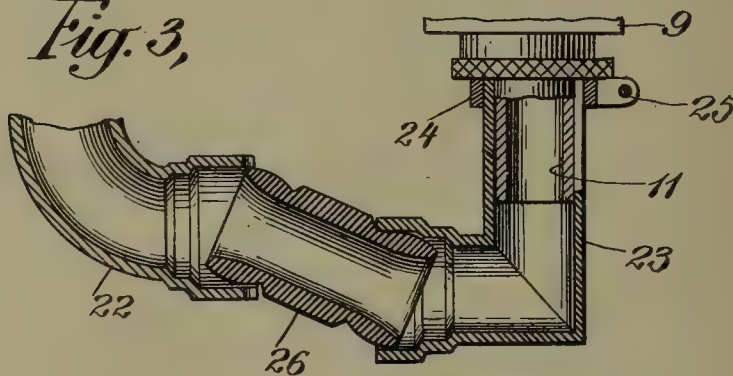


Fig. 4,



WITNESSES:

W. Edwards.
S. M. Litch

INVENTOR

Thomas Kraemer
BY
J. C. Edwards
ATTORNEY

UNITED STATES PATENT OFFICE.

THOMAS KRAEMER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

TALKING-MACHINE.

No. 882,785.

Specification of Letters Patent.

Patented March 24, 1908.

Application filed October 7, 1907. Serial No. 396,134.

To all whom it may concern:

Be it known that I, THOMAS KRAEMER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Talking-Machines, of which the following is a specification.

This invention relates to talking machines and has reference more particularly to machines of the type employing a cylindrical sound-record, a reproducer movable across the same, and a tone-arm pivotally mounted at one end and having its free end connected to the reproducer.

The object of the invention is to effect certain improvements in the construction of machines of this type with respect particularly to the devices for supporting the tone-arm and amplifying-horn upon the box of the machine and the tubular connection between the free end of the tone-arm and the reproducer.

The invention is illustrated in the accompanying drawings, in which

Figure 1 is a sectional elevation of the machine, Fig. 2 is a top view of a portion of the same, Fig. 3 is a sectional detail view showing the tubular connection between the tone-arm and reproducer, and Fig. 4 is a sectional detail view on line 4—4 of Fig. 3.

Referring to these drawings, 1 indicates the motor-box, having a top 2 and inclosing a suitable motor which is connected in driving relation to the cylindrical record-support 3 which is mounted in suitable bearings above the top 2. The shaft of the record-support 3 is extended and has a feed-screw 4 formed thereon. The reproducer-carriage 5 is mounted to slide axially of the record-support upon a rod 6 mounted parallel to the support 3 on one side thereof and a bar 7 on the opposite side thereof. A lever 8 is pivoted upon the carriage 5 and coacts with the bar 7 to support the carriage in operative position or raise it from that position so that the stylus of the reproducer is out of engagement with the cylindrical record upon the support 3, the latter position of the parts being shown in Fig. 1.

The reproducer 9 is mounted in an opening in the carriage 5 and is of the usual or any suitable construction. The diaphragm of the reproducer is vibrated by a stylus carried

by the stylus-lever 10, and a short tubular member 11 extends upwardly from the chamber back of the diaphragm. The carriage of the reproducer is provided at its left end, as shown in Fig. 2, with an arm which has a half-nut secured to its end in position to coact with the feed-screw 4 so as to move the reproducer-carriage across the record.

In order to support the amplifying-horn and the tone-arm, I provide an arm 12 furnished with a hooked portion 13 at one end thereof, this arm being adapted to extend across the top 2 of the motor-box with the hooked portion 13 extending about one edge of the top. For coaction with the other edge of the box, an angular plate 14 is provided, which engages at one edge the under side of the edge of the box and at the other edge the plate 12. Screws 15 having knurled heads extend through openings in the end of arm 12 and in plate 14, and these may be tightened up to cause the arm and plate to grip the edge of the box between them, so that the arm 12 is firmly secured to the top of the motor-box. A coupling member 16 is secured to and rises from the arm 12, and at its upper end has an opening formed therein. The upper end of the coupling member 16 is formed to receive the small end of an amplifying-horn 17 and support the same in such manner as to permit turning the horn upon the coupling member to any desired angular position. Mounted upon the coupling member 16 adjacent to one end of the opening therethrough, is a vertically disposed pin 18. The tone-arm 19 has a bracket 20 secured thereto, which carries a cross-head mounted in the bracket on horizontally disposed pivots. This bracket carries a sleeve 21 which fits over the pin 18 to hold the tone-arm in position with one end extending a short distance within the opening in the coupling member 16, in which position the tone-arm is in communication with the amplifying-horn 17 through the opening in the coupling member 16. This method of supporting the tone-arm permits of turning the same in any direction by the cross-head turning on its horizontal pivots or the sleeve 21 turning upon the pin 18, or both.

At its free end, the tone-arm 19 is connected to form a section 22 of comparatively small diameter, which section is curved to form a ninety-degree bend. This end of the

tone-arm is connected to the reproducer by metallic parts of tubular form so as to carry the sound from the reproducer to the tone-arm with as little obstruction to the sound waves as possible, and this connection has suitable joints therein, so that the passage for the sound waves is preserved although the carriage of the reproducer is moving in a straight line and the tone-arm is turning about a pivot. This connection is illustrated in Figs. 2, 3 and 4. An angular tubular member 23 has one end split and formed of such diameter that it will fit closely over the tubular extension 11 on the reproducer. A clamping-ring 24 having a clamp-screw 25 is secured upon the end of this member, and when the end of the member is inserted over the tubular extension 11 the screw 25 may be tightened to contract the split end of member 23 and cause it to grip the extension 11. The other end of the member 23 is connected to the end of the curved tubular extension 22 of the tone-arm by a tubular, metallic, connecting member 26. Each end of member 26 is curved to form a portion of a sphere, as shown in Figs. 2 and 3. These curved ends fit snugly within the ends of the members 22 and 23 and are secured therein by screws 27 threaded into openings in the parts 22 and 23 and extending loosely through openings in the member 26. These openings in member 26 are preferably short slots so that the member 26 can not only turn freely about the axes of pins 27 but also has small ranges of movement on axes perpendicular to the axes of pins 27, while being held in position by the pins. By reason of the provision for such movement of member 26 relative to each of the parts which it connects on a substantially horizontal axis, the reproducer-carriage is free to be moved about the rod 6 as a pivot through the small range made necessary by irregularities in the surface of the sound-record and for moving into and out of operative position.

Having now described my invention, what I claim as new therein and desire to secure by Letters Patent is as follows:—

1. The combination with a talking machine having a motor-box, a holder for a cylindrical sound-record mounted above the top of the box, means for rotating the holder, and a reproducer slidable in a straight line across the record, of a coupling member rising from the box, a horn supported thereby, a tone-arm having one end pivotally connected to said member, and a flexible, tubular, connection consisting of metallic tube sections pivotally connected between the free end of said tone-arm and said reproducer, substantially as set forth.

2. The combination with a talking machine having a motor-box, a holder for a

cylindrical sound-record mounted above the top of the box, means for rotating the holder, and a reproducer slidable in a straight line across the record, of a coupling member having an opening therethrough rising from said box, a horn mounted thereon, a vertically disposed pin on said coupling member, a tone-arm pivotally mounted on said pin in communication with said horn through the opening in the coupling member, and a flexible, tubular connection consisting of metallic tube sections pivotally connected between the free end of said tone-arm and said reproducer, substantially as set forth.

3. The combination with a talking machine having a motor-box, a holder for a cylindrical sound-record mounted above the top of the box, means for rotating the holder, and a reproducer slidable in a straight line across the record, of a coupling member secured to the box and rising therefrom, a horn supported thereby, a horizontally disposed tone-arm pivotally connected to the coupling member, a flexible tubular connection consisting of metallic tube-sections pivotally connected between the free end of the tone-arm and said reproducer, and means for clamping the end of one of said sections to said reproducer, substantially as set forth.

4. The combination with a talking machine having a motor-box, a holder for a cylindrical sound-record mounted above the top of the box, means for rotating the holder, and a reproducer slidable across the record, of a coupling member secured to the box and rising therefrom, a horn supported thereby, a tone-arm pivotally connected to the coupling member, a metallic tubular member secured to the reproducer, and a second metallic tubular member pivotally connected at its ends to one end of the first-named tubular member and to the free end of said tone-arm, substantially as set forth.

5. The combination with a talking machine having a motor-box, a holder for a cylindrical sound-record mounted above the top of the box, means for rotating the holder, and a reproducer slidable across the record, of a coupling member secured to the box and rising therefrom, a horn supported thereby, a tone-arm pivotally connected to the coupling member, and a metallic tubular connection between the free end of the tone-arm and the reproducer, said connection having two universal joints therein, substantially as set forth.

This specification signed and witnessed this 30 day of Sept., 1907.

THOMAS KRAEMER.

Witnesses:

H. MEIER,

H. MUHLSCHLEGEL.

No. 883,135.

PATENTED MAR. 24, 1908.

L. T. HAILE.
GRAMOPHONE.

APPLICATION FILED FEB. 21, 1907.

2 SHEETS—SHEET 1.

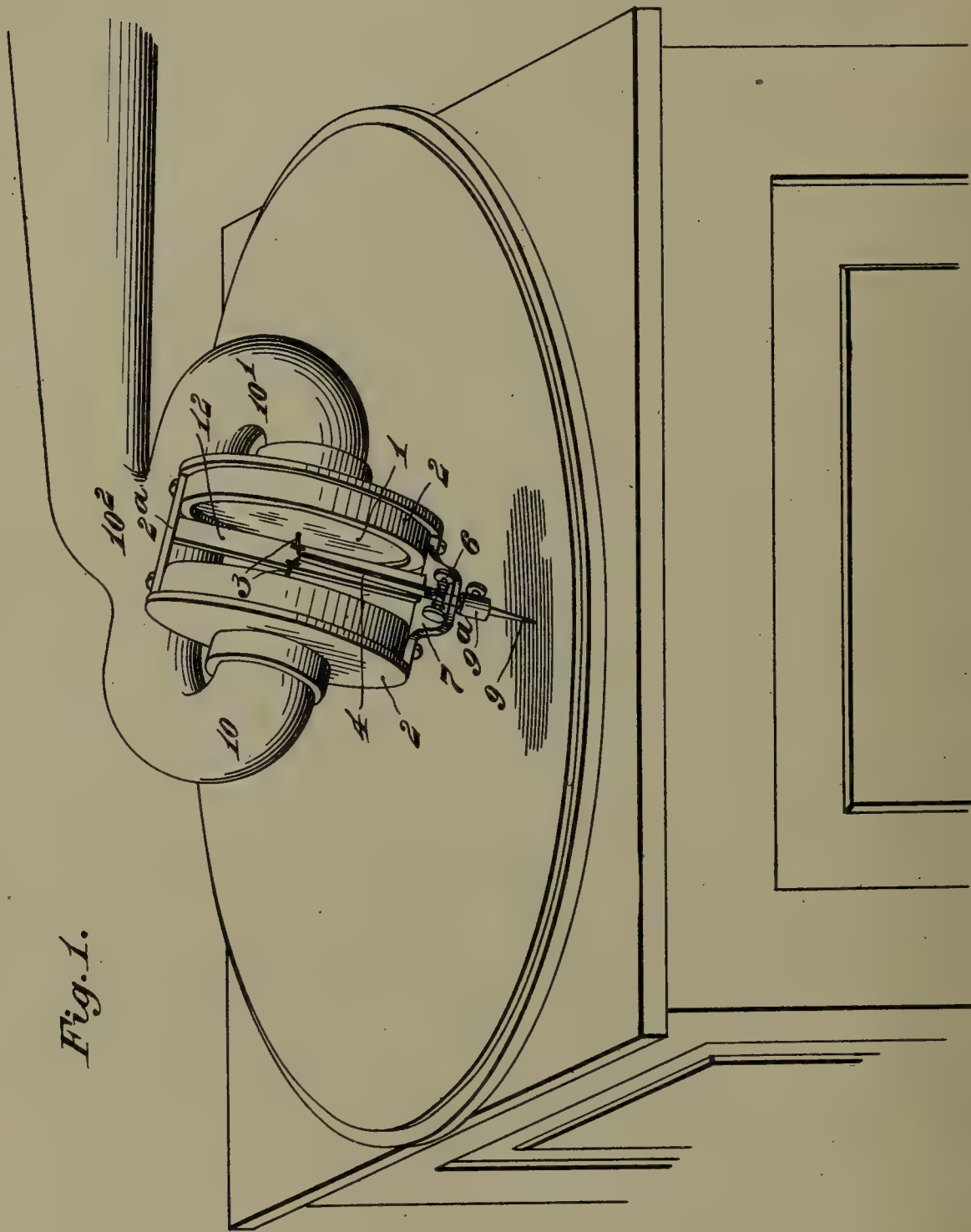


Fig. 1.

WITNESSES:

Jas. C. Robinsmith
Q. M. Kiddle

INVENTOR

Luther T. Haile

BY

H. V. Heaton

ATTORNEY.

No. 883,135.

PATENTED MAR. 24, 1908.

L. T. HAILE.
GRAMOPHONE.

APPLICATION FILED FEB. 21, 1907.

2 SHEETS—SHEET 2.

Fig. 2.

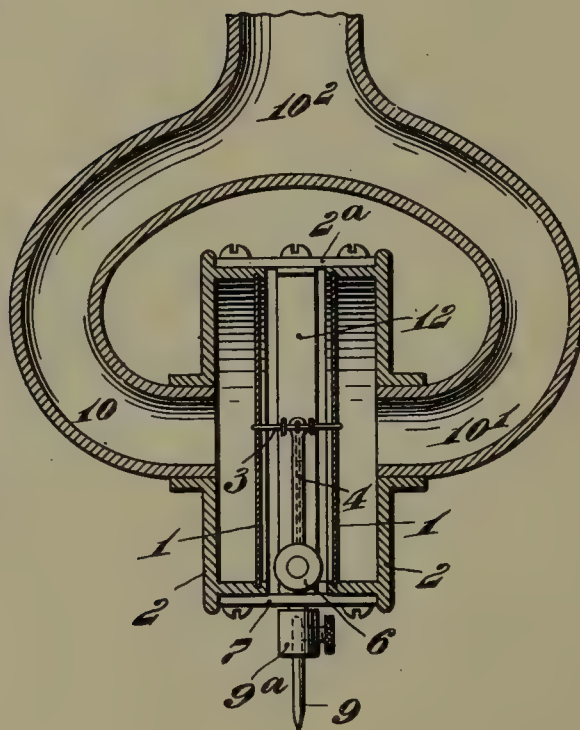
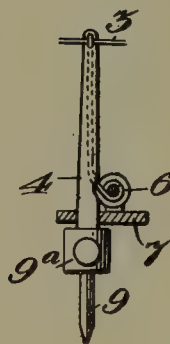


Fig. 3.



WITNESSES:

Geo. C. Hobensmith
Ada M. Ciddle

INVENTOR

Luther J. Haile
BY *H. V. Hutton*
ATTORNEY.

UNITED STATES PATENT OFFICE.

LUTHER T. HAILE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-FIFTH TO MAURICE N. WEYL AND WILLIAM A. MACKIE, ONE-FIFTH TO JOSEPH W. SHANNON, ONE-TWENTIETH TO FREDERICK J. GEIGER, AND ONE-TWENTIETH TO LOGAN W. MULFORD, OF PHILADELPHIA, PENNSYLVANIA.

GRAMOPHONE.

No. 883,135.

Specification of Letters Patent.

Patented March 24, 1908.

Original application filed July 6, 1906, Serial No. 324,978. Divided and this application filed February 21, 1907. Serial No. 358,661.

To all whom it may concern:

Be it known that I, LUTHER T. HAILE, a citizen of the United States, residing in the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Gramophones, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

The object of my invention, in devices of the class of sound-reproducing machines, is to effect a duplication of the sound-vibrations created by a single stylus or needle, by causing it to act on two diaphragms to vibrate them simultaneously and in opposite directions to each other; then to receive and collect the sound-waves created by the pulsating diaphragms in independent sound-chambers or boxes operating as diaphragm holders, and finally to discharge such sound-waves from both chambers through a single horn having a plurality of branches leading respectively to said independent sound-chambers.

To these ends my invention, which is a division of my former and pending application Serial No. 324,978 filed July 6, 1906, for Letters Patent, consists in the provision of means to mount a pair of diaphragms face to face, in spaced relation, to cause them to be simultaneously vibrated, in opposite directions, by a single stylus or needle operatively interposed between them; said combined elements being so disposed relatively to each other, that the vibratory swing of the upper end of the needle-holder caused by the lateral play of the needle in the sound grooves of the tablet, will be in a plane parallel with the plane of the faces of the diaphragms and will always be maintained substantially equidistant between them; independent holders for each diaphragm, constructed and adapted to operate as sound-collecting chambers, means to mechanically connect and operatively support the diaphragm holders in spaced relation to each other and to the interposed needle, and operatively to the record or tablet actuating the needle; and sound-conveying means consisting of a sound-horn having a plurality of

receiving branches operating to independently receive the sound-waves collected in each sound-chamber of the diaphragm holders and merge and discharge them through the single terminal horn.

In the accompanying drawings illustrating my invention, Figure 1 is an elevation, in perspective, of the exterior of the cabinet of a talking machine, showing the grooved record-tablet in place thereon, and the operative relation of my device thereto, and showing my multiple sound-box construction with forked sound-delivery horn. Fig. 2 is a front view, in vertical section, of the sound-box device, and Fig. 3 is a detached detail view of the hollow needle arm, guide-plate therefor, the stylus and connecting collar between it and the needle-arm, and means to tension the flexible connection between needle and diaphragm.

In all devices of the class of sound-reproducing machines, involving a vertically-disposed stylus or needle caused to vibrate by contact with the sound grooves of a flat tablet, and to impart such vibrations to a connected or combined diaphragm, the said elements were so arranged relatively in the combination that the needle vibrated in a direction at right angles to the plane of the face of the diaphragm. I change that and combine the parts in such manner that, without changing the relation of the needle element to the flat tablet, when they are brought, as before, into operative relation, the diaphragms will be supported over the tablet in a plane transverse to that formerly occupied and hence the needle vibrations will be in a plane parallel to the faces of the diaphragms, and hence the reciprocatory pull and release on the flexible connections between the diaphragms and the needle will cause them to vibrate in opposite directions to each other simultaneously.

I will now describe by reference to the drawings, the best form in which I have embodied my invention, and wherein the feature of a pair of diaphragms, set face to face and caused to vibrate in opposite directions to each other, in combination with the other elements above referred to, is embodied. Each of the two diaphragm holders 2, 2, is

constructed preferably in annular form but with sufficient depth to provide a sound-collecting chamber rearward of the diaphragm mounted therein. These holders are supported edgewise and in spaced relation, with their respective diaphragms facing each other; and the wall of each holder, opposite its diaphragm, is apertured for the purpose hereinafter described. The holders 2, 2, are joined and spaced by a bar 2^a at top and by the perforated plate 7 at base, said plate operating as a guide for the vibrating needle-arm. In the space thus formed between the diaphragms, and their holders, a single stylus or needle, its needle-arm and usual adjunctive parts are operatively supported and arranged. The connection between the top of the needle-arm and the two diaphragms, whereby the vibratory movements of the needle, produced by the tablet or record, is transmitted to the diaphragms, must be flexible and non-rigid, and also elastic to the extent of causing pulsations of the diaphragms, in response to the vibratory movements of the needle, without altering the normal direction of such pulsating movements, that is to say in order that the diaphragm, caused to pulsate by vibrations imparted to it, shall have normal pulsating movements unrestrained by the character of the connection employed to effect the pulsations. For this purpose a silk thread is well adapted, both for its flexibility or non-rigidity and for its slight but sufficient elasticity; but some other kind of vibration-transmitting connection which will effect the functions stated, may be employed. In using a silk thread connection, I prefer to use a hollow needle-arm 4, to which is fastened the needle or stylus 9, by collar and screw 9^a; and a reel 6 may be employed to wind the end of the thread and give such slight tension to it as may be required. A detail of some importance may be added if desired, namely, the cord connection may be made in two parts, one part which passes through and projects above the top of the needle arm 4 is provided with a small loop through which the other cord connection freely passes, its ends being secured to the oppositely-disposed diaphragms.

I prefer to arrange in the space between the diaphragms and their holders, a metallic bar 12, supported by a screw, from the upper connecting plate 2^a. The metallic bar 12 is perforated to allow the passage through it of the cord connections between the head of the needle-arm and the opposite diaphragms, and serves as a guiding support for such cord connections. The diaphragm holders 2, 2, have central apertures in the rear wall, as before stated, which communicate directly with the separate tubes 10, 10' leading, as branches, from a single tube or horn 10². Both diaphragms are simultaneously vi-

brated by the same movements of the sound-reproducing stylus or needle, producing like sound waves by like pulsations of the two diaphragms; the chambered diaphragm holders are independent sound-boxes discharging into independent sound-conveying tubes which however, merge into a single tube, hence the like sound waves created by the pair of simultaneously-acting diaphragms and proceeding from the pair of independent sound-boxes and tubes and merged and discharged from the single horn will be not only much increased in loudness but the quality of the tone will be improved.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In an instrument for reproducing sound-waves from a disk sound-record, the combination with a pair of oppositely-facing diaphragm holders operating as a multiple sound-box, each member containing a diaphragm, means to support said holders in spaced relation, with their respective diaphragms facing each other, a single needle-arm operatively supported between said diaphragms and mounted to respond to the vibratory movements of the needle, a flexible connection between the needle-arm and each diaphragm, means to operatively support the multiple sound-box in such relation to the disk-record that the vibrations of the needle-arm will be in a plane parallel with the faces of the diaphragms, and a single tubular horn diverging into two branches communicating independently with the respective rearward walls of the multiple sound-box.

2. In an instrument for reproducing sound-waves from a disk sound-record, the combination with a pair of oppositely-facing diaphragm holders operating as a multiple sound-box, each member containing a diaphragm, means to support said holders in spaced relation, with their respective diaphragms facing each other, a single hollow needle-arm operatively supported between said diaphragms, a flexible connection passing through the interior of said needle-arm and connecting it with each diaphragm, and means to adjust the tension on said flexible connection, means to operatively support the multiple sound-box in such relation to the disk-record that the vibrations of the needle-arm will be in a plane parallel with the faces of the diaphragms, and a single tubular horn diverging into two branches communicating independently with the respective rearward walls of the multiple sound-box.

3. In an instrument for reproducing sound-waves, the combination with a pair of oppositely-disposed diaphragm holders operating as sound-boxes, each containing a diaphragm, means to support said holders in spaced relation with their respective diaphragms facing each other, a stylus or record

needle and a single needle-arm operatively supported between said diaphragms and mounted to respond to the vibratory movements of the needle, connecting means between the needle-arm and each of the diaphragms, adapted to permit the diaphragms to vibrate in opposite directions to each other and operating to transmit the sound vibrations of the needle to each diaphragm separately but simultaneously, and a single tubular horn diverging into two tubular branches communicating independently with each of the pair of diaphragm holders.

4. In an instrument for reproducing sound-waves, the combination with a pair of diaphragms facing each other, a pair of sound boxes in which said diaphragms are mounted, bars connecting said sound-boxes with each other, externally, and operating to support them, in spaced relation; one of said bars being perforated and operating as a guide-plate for the vibrating needle-arm; a

stylus or record needle and a single needle-arm mounted to respond to the sound vibrations of the needle and operatively supported in the space between said diaphragms, means between the single needle arm and each diaphragm adapted to permit the diaphragms to vibrate in opposite directions to each other and operating to transmit the sound vibrations of the needle to each diaphragm separately but simultaneously, each of said sound-boxes having an aperture in its wall opposite the diaphragm, with means communicating with said apertures to receive and convey the sound-waves.

In testimony whereof, I have hereunto affixed my signature this sixteenth day of February A. D. 1907.

LUTHER T. HAILE.

Witnesses:

ADA M. BIDDLE,
JAS. C. WOBENSMITH.

No. 883,190.

PATENTED MAR. 31, 1908.

S. W. GIBBS.

PHONOGRAPH STOP.

APPLICATION FILED AUG. 12, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

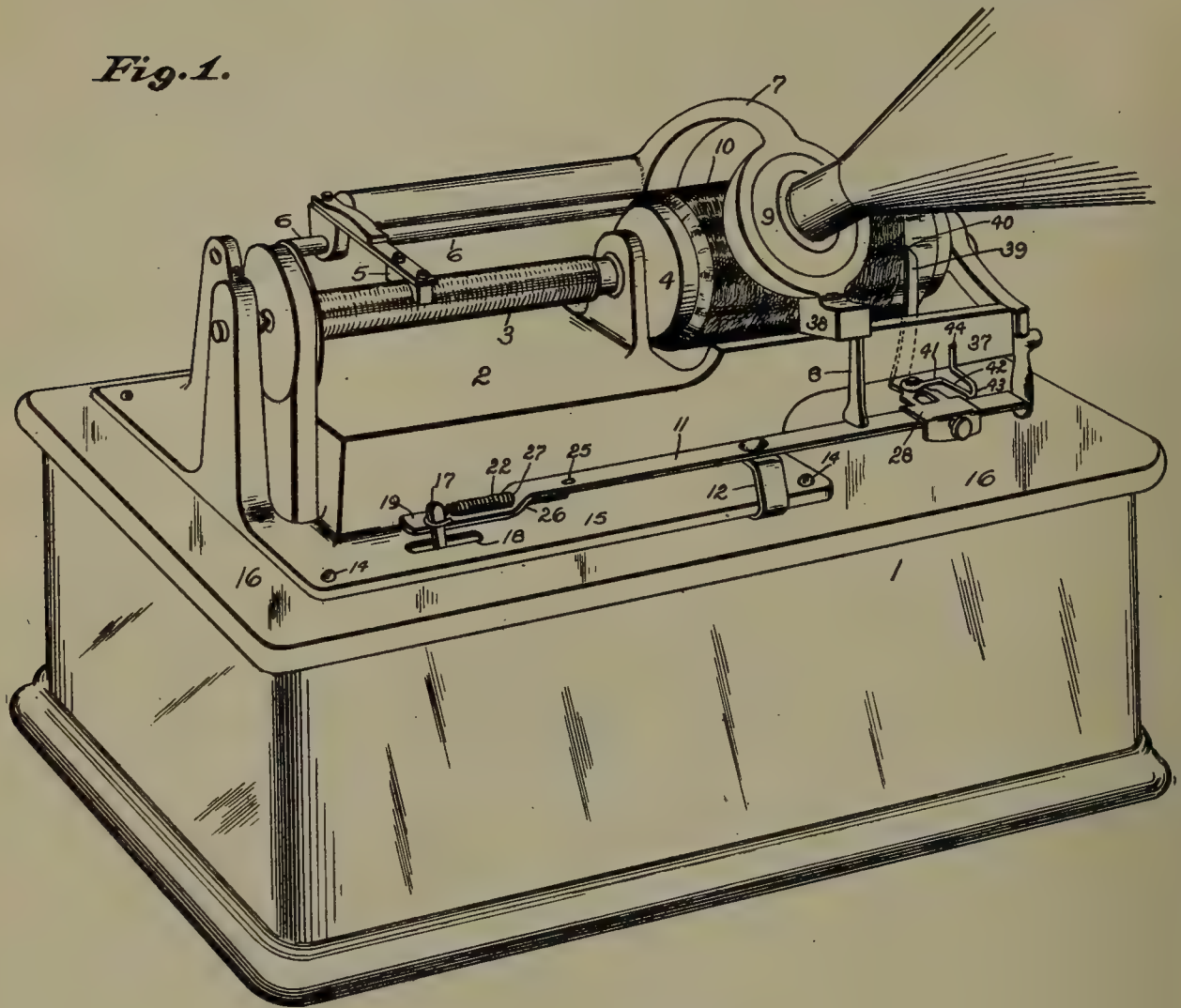


Fig. 2.

Fig. 3.

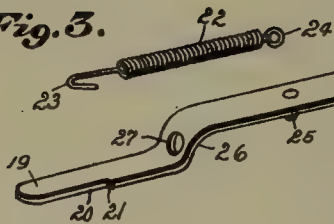


Fig. 5.

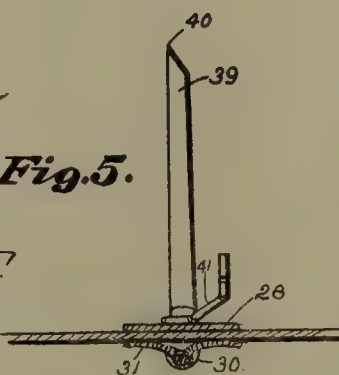
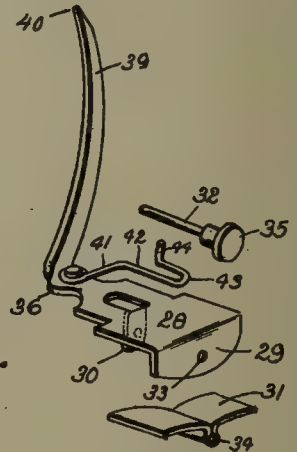
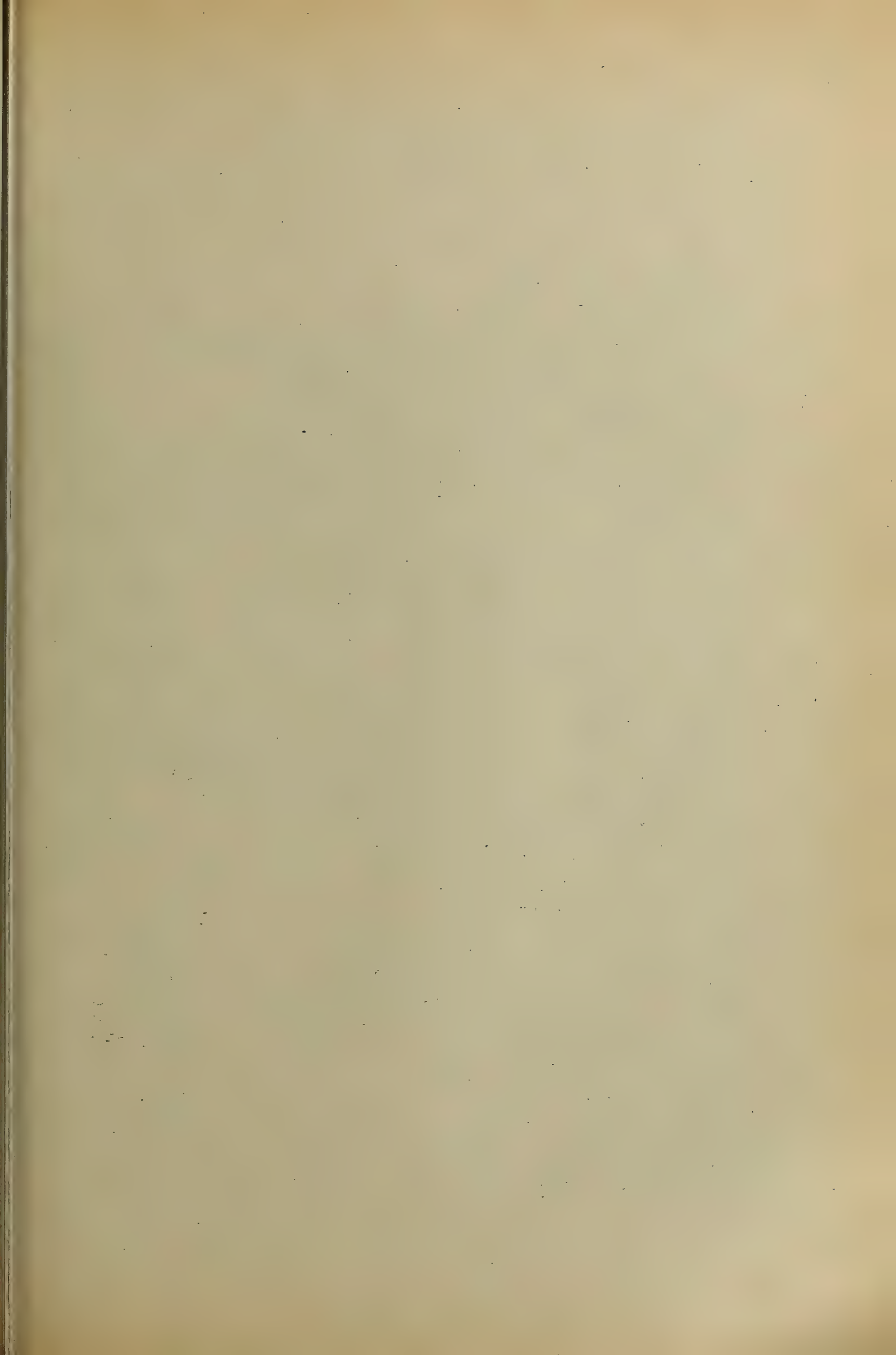


Fig. 4.



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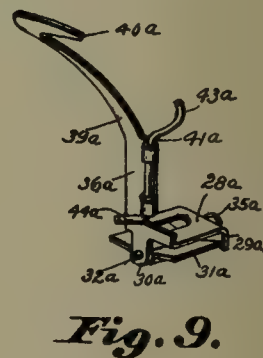
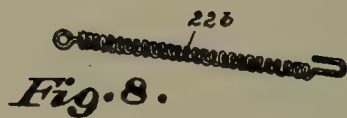
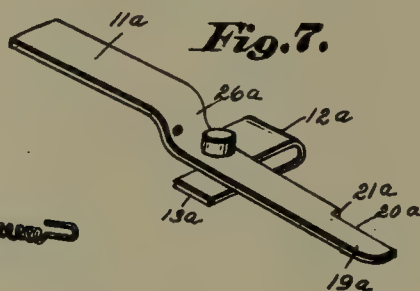
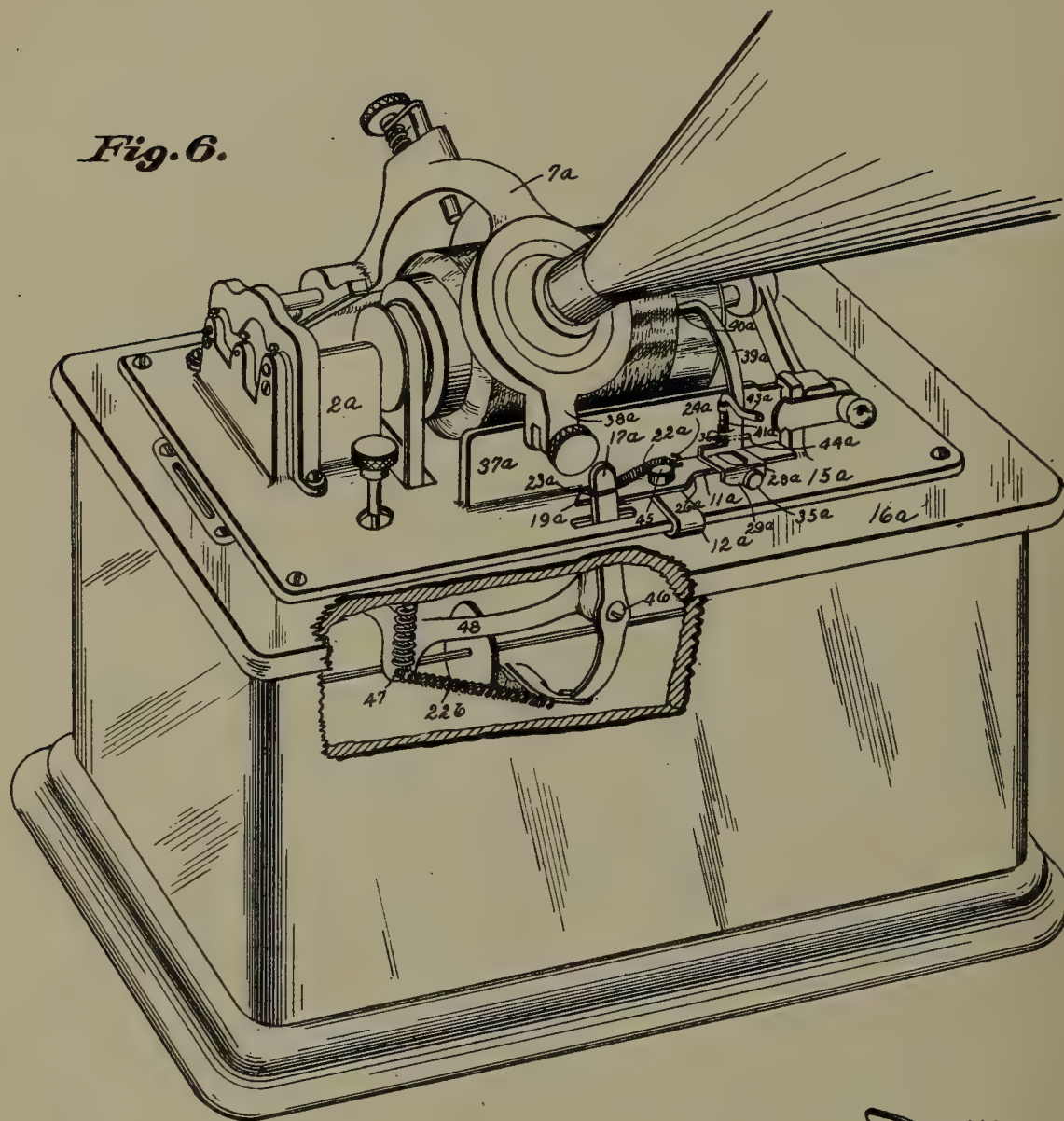


S. W. GIBBS.

PHONOGRAPH STOP.

APPLICATION FILED AUG. 12, 1907.

2 SHEETS—SHEET 2.



Witnesses
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UNITED STATES PATENT OFFICE.

SYLVESTER W. GIBBS, OF CANTON, OHIO, ASSIGNOR OF ONE-HALF TO THE GIBBS MANUFACTURING COMPANY, OF CANTON, OHIO, A CORPORATION OF OHIO.

PHONOGRAPH-STOP.

No. 883,190.

Specification of Letters Patent.

Patented March 31, 1908.

Application filed August 12, 1907. Serial No. 388,172.

To all whom it may concern:

Be it known that I, SYLVESTER W. GIBBS, a citizen of the United States, residing at Canton, in the county of Stark and State of Ohio, have invented a new and useful Phonograph-Stop, of which the following is a specification.

The invention relates to an automatic mechanism for stopping the motor of a phonograph when the button arm of the reproducer has traveled to the end of the indentations on the record cylinder; and the objects of the improvement are to provide a simple and inexpensive device for the purpose mentioned, which can be readily applied to an ordinary phonograph without special preparation or provision being made therefor, which can be readily adjusted to conform to the varying lengths of the record indentations on various cylinders, which is sensitive but certain in its operation, and which is automatically set when the starting lever has been moved into operative position. These objects are attained by the construction, mechanism and arrangement illustrated in connection with two of the ordinary sizes or styles of phonographs in common use, in the accompanying drawings, in which—

Figure 1 is a perspective view of a larger size type of phonograph in common use, showing the stop mechanism adapted and applied thereto; Fig. 2, a detached perspective view of the long controlling-lever which is adapted for use on the larger phonograph; Fig. 3, a detached perspective view of the actuating-spring; Fig. 4, a detached perspective view of the long controlling-lever trip-bracket with the trip-lever thereon, showing the spring and handle separated from the body of the bracket; Fig. 5, a fragmentary sectional view showing the trip-bracket on the controlling-lever; Fig. 6, a perspective view of a smaller size type of phonograph in common use, showing the stop mechanism adapted and applied thereto; Fig. 7, a detached perspective view of the short controlling-lever which is adapted for use on the smaller phonograph; Fig. 8, a detached perspective view of the alternate actuating-spring; and Fig. 9, a detached perspective view of the short-lever trip-bracket, showing the trip-lever thereon.

Similar numerals refer to similar parts throughout the drawing.

Referring to the larger phonograph, illustrated in Sheet 1 of the drawings, the case 1 for the motor mechanism (not shown) and the frame 2 for the phonograph mechanism, the main shaft 3, the cylinder 4, the feed-nut 5, the back-rod 6, the speaker-arm 7, its lift-lever 8, the reproducer 9 and the record-cylinder 10 mounted on the main cylinder, are of the well known character and form employed in phonographs of this type, and do not constitute any part of the present invention. The long controlling-lever 11 is pivoted at a point intermediate its ends to the connecting-bracket 12 having the flat foot 13 thereon, by means of which the stop mechanism is preferably attached to the phonograph. This attachment is made by loosening the screws 14 employed for fastening the phonograph-frame to the case, then slipping the foot of the connecting-bracket under the base-plate 15 of the frame, after which the screws 14 are tightened, thus clamping the foot 13 of the connecting-bracket between the base-plate of the frame and the cover 16 of the case and securely and rigidly holding the stop mechanism in proper position. In this type of phonograph the free end of the starting-lever 17 protrudes upward through the slot 18 in the base-plate of the frame, and the motor mechanism is adapted to be started by moving the end of this lever outward, that is toward the adjacent end of the frame, and to be stopped by moving the end of this lever inward toward the middle portion of the frame. The actuating-end 19 of the controlling-lever is located back of the starting-lever and on its forward edge are provided the recess 20 and the shoulder 21, in which recess and against which shoulder the starting-lever is adapted to rest and to be held when in its open or operative position.

The actuating-spring 22 is preferably in the form of a coiled spring with the hook 23 on its outer end adapted to engage the starting-lever and the eye 24 on its inner end by which it is connected with the controlling-lever, as by means of the rivet 25. The bend 26 is preferably provided near the actuating end of the controlling-lever to bring the respective parts thereof in the proper plane, and the actuating-spring is preferably passed through the aperture 27 in this bend. It is evident that the tension of the actuating spring is slightly diagonal, so that the ac-

tuating end of the controlling-lever is drawn forward at the same time the starting-lever is drawn inward, and the starting-lever is thus securely held in the angle of the shoulder in the front edge of the controlling-lever.

5 The trip-bracket 28 is preferably formed of a flat plate adapted to rest and slide endwise on the upper side of the trip end of the controlling-lever, with the ears 29 and 30
10 formed from the body of the plate and bent downward over the front and back edges of the controlling-lever. The flattened or leaf spring 31 is attached to the bracket, as by means of the rivet-pin 32 passed through
15 the apertures as 33 in the ears thereof and through the tubular aperture 34 formed in the spring, and the handle 35 is preferably provided on the front end of the rivet-pin. The leaf-spring 31 is adapted to press against
20 the under side of the stop-lever, so that the trip-bracket can be readily adjusted by forcefully sliding it longitudinally along the lever and is then held in any desired position by the frictional contact of the spring.

25 The rear portion 36 of the trip-bracket extends under and to the rear of the elevated track-bar 37, as the same is formed in this type of phonograph, along which track bar the foot 38 of the speaker-arm is adapted to
30 travel. The indicating finger 39 is formed or attached on the rear end of the trip-bracket, and extends upward behind the track-bar and in front of the record-cylinder, and the point 40 of this finger is adapted to be ad-
35 justed by a proper movement of the trip-bracket to register with the end of the indentations on the record-cylinder, or to any other point with reference to which it is desired to stop the motor mechanism.

40 For use in the larger phonograph the trip-lever 41 is preferably formed of strong, stiff wire, and is pivoted to the trip-bracket at a point behind the track-bar, whence it extends forward and preferably outward to an
45 angle or bend, as at 42, normally directly under the track-bar, whence it extends directly forward in the path of the depending lift-lever 8 of the speaker-arm and is doubled upward and backward upon itself, as at 43,
50 to the upwardly extending end or shoulder 44 which normally abuts against the forward face of the track-bar. The trip-lever thus described is the preferred form when made of wire, but it is evident that this particular
55 construction is not essential for the performance of its proper functions, so long as the lever is provided with an arm, as 43, in the path of the lift-lever and a cam-acting shoulder, as 44, in abutment with the face of
60 the phonograph frame, which arm and shoulder are eccentric to the axis of the pivot of the lever. And it will be understood that, for the purposes of this invention, the lift-arm need not be distinguished from the
65 speaker-arm to which it is pivoted, for they

both travel together and it is immaterial whether the trip-lever is in the path of the one or the other.

In use, when the starting-lever is thrown toward the end of the phonograph into position for starting the motor mechanism, the
70 actuating end of the controlling-lever is drawn forward by the action of the actuating-spring, so that the starting lever is engaged in the recess and against the shoulder
75 formed in the front edge of the controlling-lever, and it is likewise held in this position while the motor mechanism operates the phonograph mechanism and the reproducer is moved from the inner towards the outer
80 end of the record-cylinder. When the depending lift-lever 8 comes in contact with the arm 43 of the trip-lever, the same is carried outward, and in so doing the shoulder 44 of the trip-lever, being in abutment with the
85 forward face of the track-bar, slides along the same and becomes a movable fulcrum, about which fulcrum the trip-lever is rotated and its pivot is carried or thrown forward. This forward movement of the pivot of the
90 trip-lever throws the trip-bracket with the trip-end of the controlling-lever forward and the actuating-end of the controlling-lever backward, so that the shoulder in the front-edge thereof is moved laterally out of en-
95 gagement with the starting-lever, and the actuating-spring then pulls the starting-lever inward and stops the motor mechanism.

The parts of the stop mechanism are so proportioned and positioned that by adjust-
100 ing the point of the indicating-finger to register with the outer end of the indentations on the record-cylinder the motor mechanism will be stopped when the button-arm (not shown) of the reproducer has traveled to
105 the same end of the indentations. It is evident that when the starting-lever is again thrown outward to the position for starting the motor mechanism, the stop mechanism will be automatically set for another action
110 as before.

Referring to the smaller phonograph illustrated in Sheet 2 of the drawings, the short
controlling-lever 11^a is pivoted intermediate its ends to the connecting-bracket 12^a hav-
115 ing the foot 13^a, which foot is adapted to be clamped between the base-plate 15^a of the phonograph-frame and the cover 16^a of the motor mechanism as described above for the larger phonograph. The actuating-end 19^a
120 of the short controlling-lever is likewise located back of the free end of the starting-lever 17^a of the motor mechanism and is provided with the recess 20^a and the shoulder 21^a which are adapted to receive and stop
125 the starting-lever 17^a when the same is thrown outward to the position for starting the motor mechanism.

The ordinary actuating-spring 22^a is provided with the hook 23^a adapted to engage
130

the starting-lever and with the eye 24^a in the other end adapted to connect with the short controlling-lever preferably at the bend 26^a therein on the remote side of its pivot-post

5 45. The actuating-spring 22^a preferably passes back of the pivot-post, so that the tension of the spring will pull the actuating end of the controlling-lever slightly forward when pulling the starting-lever inward. It
10 has been found, however, in practice, that the starting-levers of the so-called smaller phonographs are not uniform in size or shape, so that it is not practicable to use the same form and length of actuating-spring for all
15 machines of this type; and in order to make a stop mechanism which can be used universally on the smaller phonograph it is preferred to use the alternate actuating-spring 22^b which is connected at one end with the
20 starting-lever within the case below its pivot 46, and at the other end to the spring post 47 which is formed or attached on the speed-adjusting-lever 48 in the motor mechanism as shown in Fig. 6.

25 When the alternate actuating-spring 22^b is employed, the ordinary actuating-spring 22^a can be omitted in the stop mechanism for the smaller phonographs without affecting the essential operations of the same; for,
30 when using the short controlling-lever, the spring between the free end of the starting-lever and the controlling-lever is not so important because of the comparatively short distance between the stop-shoulder 21^a of
35 the controlling-lever and the pivot-point thereof. When the ordinary actuating-spring is not used, the operator readily sets the stop mechanism for action, by using the forefinger of the left hand for moving the ac-
40 tuating end of the controlling-lever forward at the same time the thumb of the same hand is used for moving the starting-lever outward.

45 The track-bar 37^a in the smaller phonograph is formed integral with the base-plate 15^a of the phonograph-frame 2^a throughout its length, so that there is no space underneath the track-bar through which the trip-bracket and trip-lever can extend. For
50 this reason these parts must be formed and located entirely on the forward side of the track-bar. The body of the trip-bracket 28^a, the ears 29^a and 30^a, the leaf-spring 31^a, the rivet-pin 32^a and the handle 35^a are preferably made the same as or similar to the like
55 parts of the trip-bracket described for use with the larger phonograph. The indicating-finger 39^a, however, is formed or attached to the bracket, and extends upward on the forward side of the track-arm, and thence
60 is bent upward and backward to bring its point 40^a adjacent to the record-cylinder; and the trip-lever 41^a is pivoted on the vertical-extension 36^a of the trip-bracket and is
65 provided with the arm 43^a which extends

forward in the path of the foot 38^a of the speaker-arm 7^a, and also with the rearward shoulder-forming arm 44^a which abuts as a cam the forward face of the track-bar 37^a, the arm and shoulder of the trip-lever being
70 eccentric to the axis of its pivot.

In use, it is evident that when the foot 38^a of the speaker-arm 7^a of the phonograph mechanism comes in contact with the trip-
75 arm 43^a, the same will be carried outward with it, thus rotating the trip-lever on its pivot, and the trip-shoulder 44^a which abuts the face of the track-bar 37^a acts as a fulcrum and forces the pivot of the trip-lever
80 forward, so that the trip-bracket and the trip-end of the short controlling-lever are thrown forward and the motor mechanism of the phonograph is thereby stopped in the same manner as described for the long controlling-lever.
85

It will be understood that in both forms of the stop mechanism which have been described, whenever a new record cylinder is placed on the cylinder of the phonograph, the trip-bracket is adjusted longitudinally on the
90 controlling-lever, if necessary, so that the point of the indicating-finger will register with the end of the indentations on the record-cylinder, which adjustment insures that the motor mechanism will be promptly and
95 surely stopped when the button-arm of the reproducer reaches the same point.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a phonograph having a frame with a
100 movable speaker-arm and a motor mechanism with a spring-controlled starting-lever; a stop-mechanism comprising a controlling-lever pivotally connected with the frame, a shoulder on one end of the controlling-lever
105 adapted to hold the starting-lever open, a bracket on the other end of the controlling-lever, an indicating-finger on the bracket, and a trip-lever pivoted on the bracket and having a trip-arm in the path of the speaker-arm and a cam-acting shoulder abutting the frame whereby the movement of the speaker-arm rotates the controlling-lever to disengage its shoulder from the starting-lever.
110

2. In a phonograph having a frame with a
115 movable speaker-arm and a motor-mechanism with a spring-controlled starting-lever; a stop-mechanism comprising a controlling-lever pivotally connected with the frame, a shoulder on the controlling-lever adapted to hold the starting-lever open, a bracket on the controlling-lever, an indicating-finger on the
120 bracket, and a trip-lever pivoted on the bracket and having a trip-arm in the path of the speaker-arm and a cam-acting shoulder
125 abutting the frame whereby the movement of the speaker-arm rotates the controlling-lever to disengage its shoulder from the starting-lever.

3. In a phonograph having a frame with a 130

- movable speaker-arm and a motor mechanism with a spring-controlled starting-lever; a stop-mechanism comprising a controlling-lever pivotally connected with the frame, 5 means for detachably engaging the controlling-lever with the starting-lever in its open position, a bracket on the controlling-lever, an indicating-finger on the bracket, and a trip-lever pivoted on the bracket and having 10 a trip-arm in the path of the speaker-arm and a cam-acting shoulder abutting the frame whereby the movement of the speaker-arm rotates the controlling-lever to disengage the starting-lever.
- 15 4. In a phonograph having a frame with a movable speaker-arm and a motor-mechanism with a spring-controlled starting-lever; a stop-mechanism comprising a controlling-lever pivotally connected with the frame, 20 means for detachably engaging the controlling lever with the starting-lever in its open position, a bracket on the controlling-lever, a trip-lever pivoted on the bracket and having a trip-arm in the path of the speaker-arm and 25 a cam-acting shoulder abutting the frame whereby the movement of the speaker-arm rotates the controlling-lever to disengage the starting-lever.
- 30 5. In a phonograph having a frame with a movable speaker-arm and a motor-mechanism with a starting-lever; a stop-mechanism comprising a controlling-lever pivotally connected with the frame, a shoulder on the controlling-lever adapted to hold the starting-lever in its open-position, a spring acting to draw the starting-lever into the angle of the 35 shoulder, and means on the controlling-lever

in the path of the speaker-arm whereby the movement of the speaker-arm rotates the controlling-lever to disengage its shoulder 40 from the starting-lever.

6. In a phonograph stop-mechanism, a controlling-lever pivotally connected with the phonograph-frame, a trip-lever pivotally connected with the controlling-lever and 45 having a trip-arm in the path of the phonograph speaker-arm and a cam-acting shoulder abutting the phonograph-frame.

7. In a phonograph stop-mechanism, a controlling-lever, a slidable trip-bracket on the lever and a spring on the bracket in frictional contact with the lever.

8. In a phonograph, a case, a frame attached on the case, and a stop-mechanism bracket having a foot adapted to be entered 55 and clamped between the case and the frame.

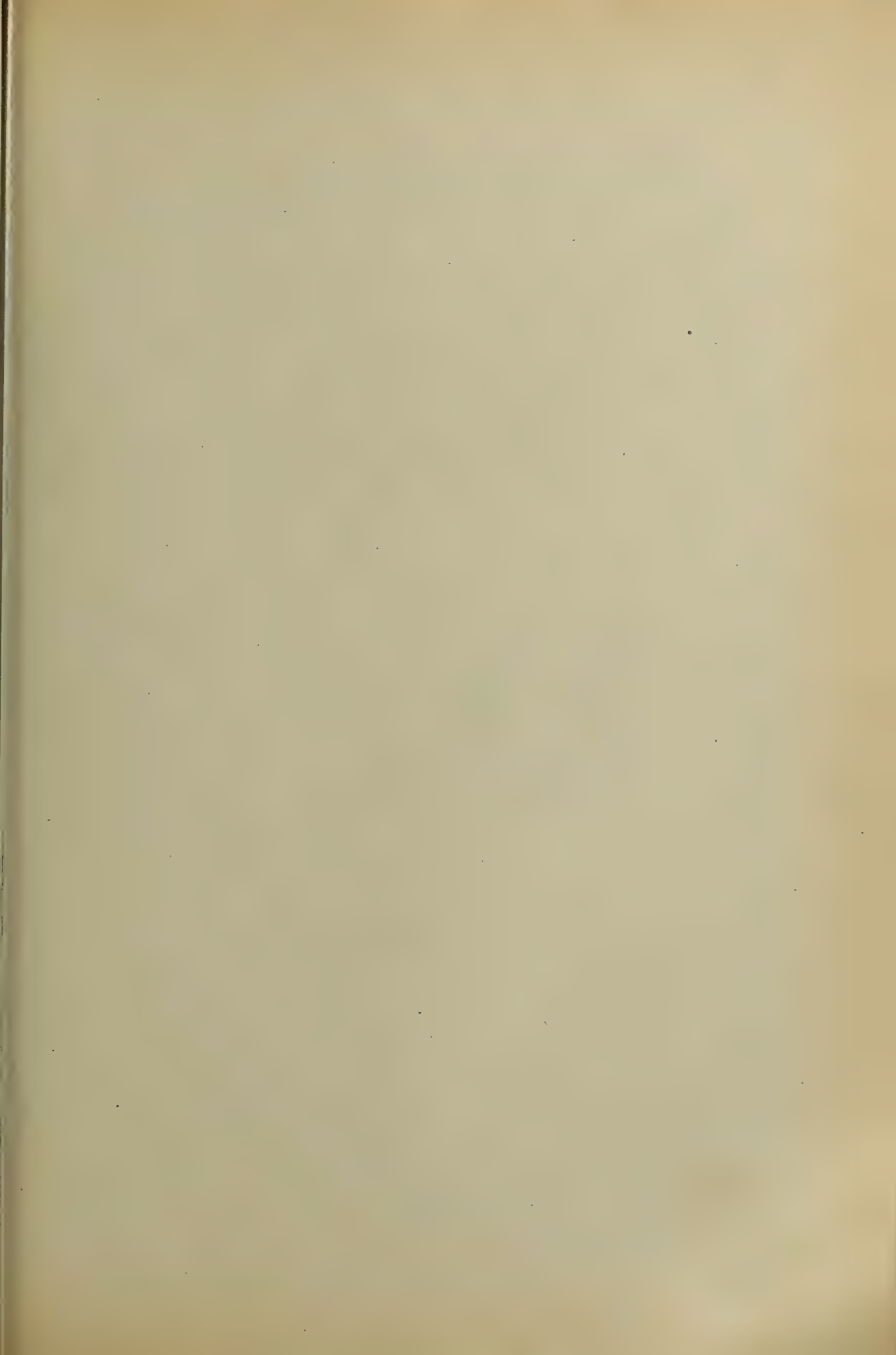
9. In a phonograph, a motor-mechanism having a starting lever, a controlling-lever connected with the phonograph, a shoulder on the controlling-lever, and a spring acting 60 to draw the starting lever into the angle of the shoulder.

10. In a phonograph stop-mechanism, an oscillatable controlling-lever connected with the phonograph-frame, an oscillatable trip- 65 lever connected with the controlling-lever and having a trip arm in the path of the phonograph speaker-arm and a cam-acting shoulder abutting the phonograph-frame.

SYLVESTER W. GIBBS.

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HARRY FREASE.



No. 883,327.

PATENTED MAR. 31, 1908.

W. H. MILLER.
DIAPHRAGM.

APPLICATION FILED SEPT. 24, 1906.

2 SHEETS—SHEET 1.

Fig. 2

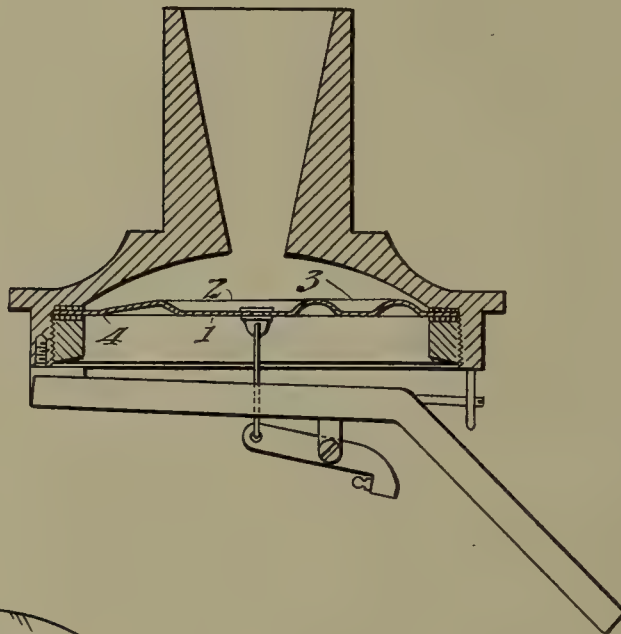


Fig. 1

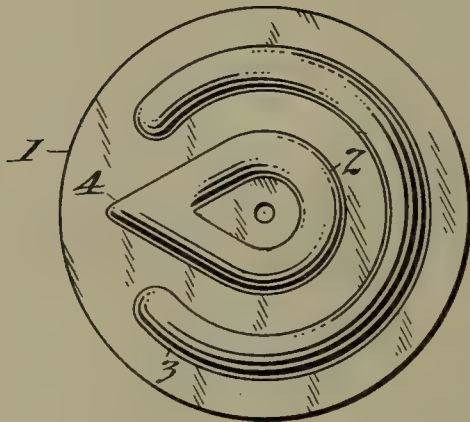
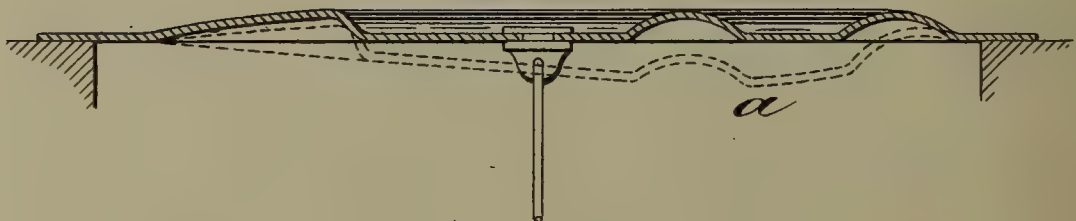


Fig. 3



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APPLICATION FILED SEPT. 24, 1906.

2 SHEETS—SHEET 2.

Fig. 4

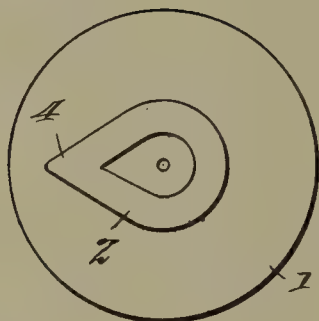


Fig. 6



Fig. 5



Fig. 7



Fig. 8

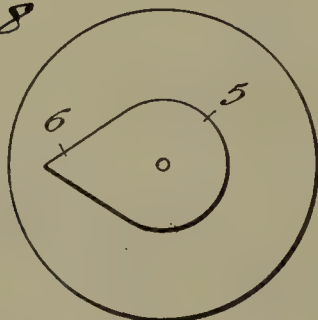


Fig. 10

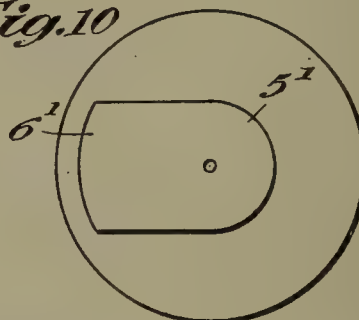


Fig. 9



Fig. 11



Fig. 12

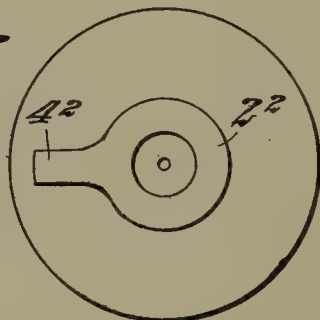


Fig. 14

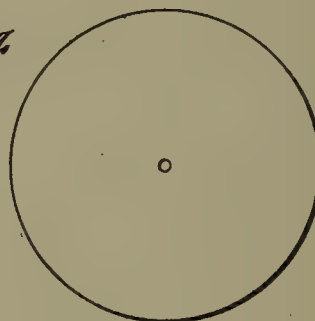


Fig. 13



Fig. 15



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UNITED STATES PATENT OFFICE.

WALTER H. MILLER, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

DIAPHRAGM.

No. 883,327.

Specification of Letters Patent.

Patented March 31, 1908.

Application filed September 24, 1906. Serial No. 335,878.

To all whom it may concern:

Be it known that I, WALTER H. MILLER, a citizen of the United States, residing at Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Diaphragms, of which the following is a description.

My invention relates to diaphragms and more particularly to phonographic diaphragms such as those used in recorders and reproducers.

The object of my invention is the production of a diaphragm which will produce improved results especially in the reproduction of sound, such as greater loudness and purer quality.

Reference is hereby made to the accompanying drawings of which

Figure 1 is a plan view of the preferred form of diaphragm; Fig. 2 is a vertical section of a phonograph reproducer containing the diaphragm of Fig. 1; Fig. 3 is an enlarged sectional view illustrating the flexure of the diaphragm under the influence of the reproducer stylus, the amount of flexure being greatly exaggerated; Figs. 4 and 5 are respectively a plan and section of a modification of my invention; Figs. 6 and 7, 8 and 9, 10 and 11, 12 and 13, and 14 and 15 are similar views of other modifications.

The same numerals of reference are used to designate corresponding parts in the several views.

In using all forms of diaphragms shown I propose to connect the reproducer stylus with the geometrical center of the diaphragm. The diaphragms are, however, unsymmetrical as regards their rigidity or resistance to flexure, the resistance being greater on one side of a median line than on the other; that is, the diaphragm is stiffer on one side of said line than on the other. The effect of such construction is that the stress applied by the stylus to the center of the diaphragm produces the greatest amplitude of vibration at a point at one side of said center, instead of at the center as in symmetrical diaphragms. The point at which the greatest amplitude of vibration occurs I term the acoustical center of the diaphragm.

The unequal rigidity, stiffness or resistance to flexure referred to may be produced in a variety of ways, as for instance by adding additional material to the diaphragm, or by denting or stamping the material of the

diaphragm as illustrated in the drawing. The latter is considered preferable as it does not increase the weight of the diaphragm. The material used may be sheet metal such as aluminium, steel, copper, etc. or fiber treated in such a manner as to prevent attack by moisture, and in fact a great variety of materials may be used.

Referring now more particularly to the diaphragm of Figs. 1 to 3, the same consists of a circular plate 1, stamped with two grooves or elevations 2 and 3. The groove 2 which is nearest the center is in the shape of a circle with a lateral extension 4. The point of this extension appears to act as a hinge or pivot for that part of the diaphragm which falls within the outline of the elevation 2 when stress is applied to the geometrical center of the diaphragm, thus producing an amplified movement of certain parts of the diaphragm which are diametrically opposite the extension 4 as indicated in Fig. 3 wherein the point of greatest amplitude or acoustical center is located at about the point *a*. It should be understood that the depth of the grooves 2 and 3 is greatly exaggerated in the drawing. These grooves may be of the width shown but are ordinarily quite shallow, as for example in a diaphragm whose diameter is one and five sixteenths inches the groove may be about three one-hundredths of an inch in depth. The groove 3 is in the form of an incomplete circle the break in the circle being adjacent the lateral extension 4. This groove or rib prevents any buckling of the diaphragm. Its ends should not approach too near the inner rib 2 in order that the diaphragm may not be weakened; that is, there should be substantially the same amount of material between the ends of the rib 3 and the extension 4 as between the rib 3 and the circular portion of the rib 2.

The diaphragm of Figs. 4 and 5 is similar to that of Fig. 1 except that the rib 3 is dispensed with.

The diaphragm of Figs. 6 and 7 is the same as that of Figs. 4 and 5 except a slight difference in the shape of the rib 2' and lateral extension 4'.

In the diaphragm of Figs. 8 and 9 the stiffened portion is in the form of a circle 5 having a lateral extension 6. In this form the outline of the stiffened portion is the same as that of Fig. 4, but the whole body of

material is struck up instead of merely a groove.

The diaphragm of Figs. 10 and 11 has a struck up portion 5' with a lateral extension 6'.

The diaphragm of Figs. 12 and 13 is similar to that of Figs. 6 and 7 except in the shape of the extension 4² which projects from the circular rib 2².

10 The diaphragm of Figs. 14 and 15 is a flat plate whose section is the form of a wedge as shown, the thickness gradually increasing from the right hand side or edge of the diaphragm toward the left.

15 Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. A diaphragm having a perforation at its geometrical center and having an acoustical center at a substantial distance therefrom, substantially as set forth.

2. In a device of the class described, the combination with a circular diaphragm whose acoustical center is at a substantial distance from its geometrical center, of a stylus connected to said diaphragm at its geometrical center, substantially as set forth.

3. In a device of the class described, the combination with a stylus, of a diaphragm stiffened in such a way that stress applied to its center by said stylus produces the greatest amplitude of vibration at a point at a substantial distance from said center, substantially as set forth.

35 4. A circular diaphragm provided with a perforation at its center and stiffened in such a way that stress applied to its central portion produces the greatest amplitude of vibration at a substantial distance from said central portion, substantially as set forth.

45 5. In a device of the class described, the combination of a diaphragm having stiffening means applied to its central portion and extending farther from the center of the diaphragm in one direction than in the opposite direction and so shaped as to produce its greatest stiffening effect along a line pass-

ing through said center, and a reproducer stylus connected to said diaphragm at its center, substantially as set forth.

6. In a device of the class described, the combination of a diaphragm which has greater stiffness or resistance to flexure on one side of a median line than on the other, and a reproducer stylus connected to the center of said diaphragm, substantially as set forth.

7. A diaphragm having a central stiffened portion whose outline is a circle with a lateral extension, substantially as set forth.

8. A diaphragm having a central stiffened portion in the shape of a circular groove or rib with a lateral extension, substantially as set forth.

9. A diaphragm having a central stiffened portion whose outline is a circle with a lateral extension, and an incompletely circular stiffened portion surrounding the same, substantially as set forth.

10. A diaphragm having a central stiffened portion whose outline is a circle with a lateral extension, and an incompletely circular stiffened portion surrounding the same, the break in said circle being adjacent said lateral extension, substantially as set forth.

11. A diaphragm having a central stiffened portion in the shape of a circular groove or rib with a lateral extension, and an incompletely circular groove or rib surrounding the same, substantially as set forth.

12. A diaphragm having a central stiffened portion in the shape of a circular groove or rib with a lateral extension, and an incompletely circular groove or rib surrounding the same, the break in said circle being adjacent said lateral extension, substantially as set forth.

This specification signed and witnessed this 22nd day of September 1906.

WALTER H. MILLER.

Witnesses:

FRANK L. DYER,
DELOS HOLDEN

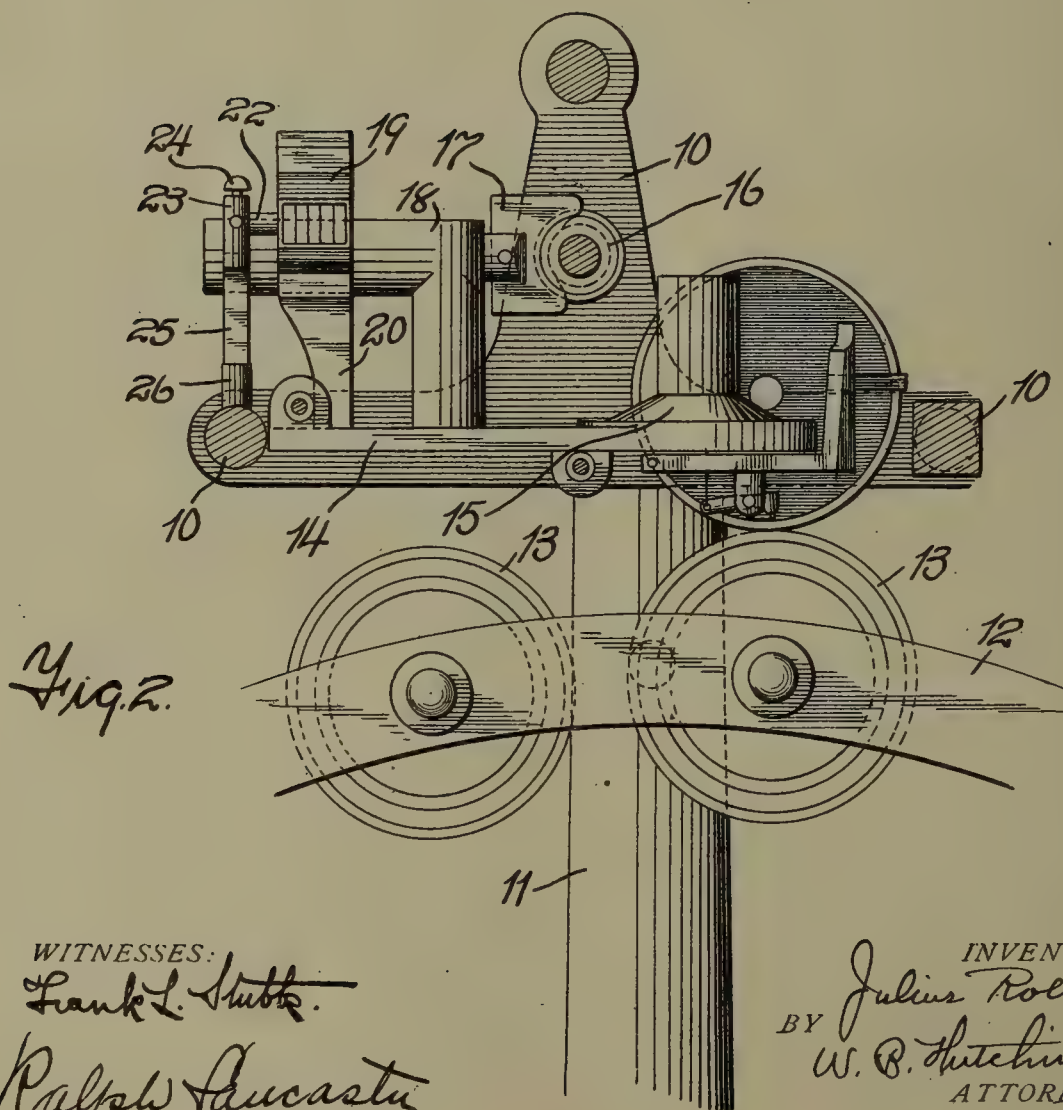
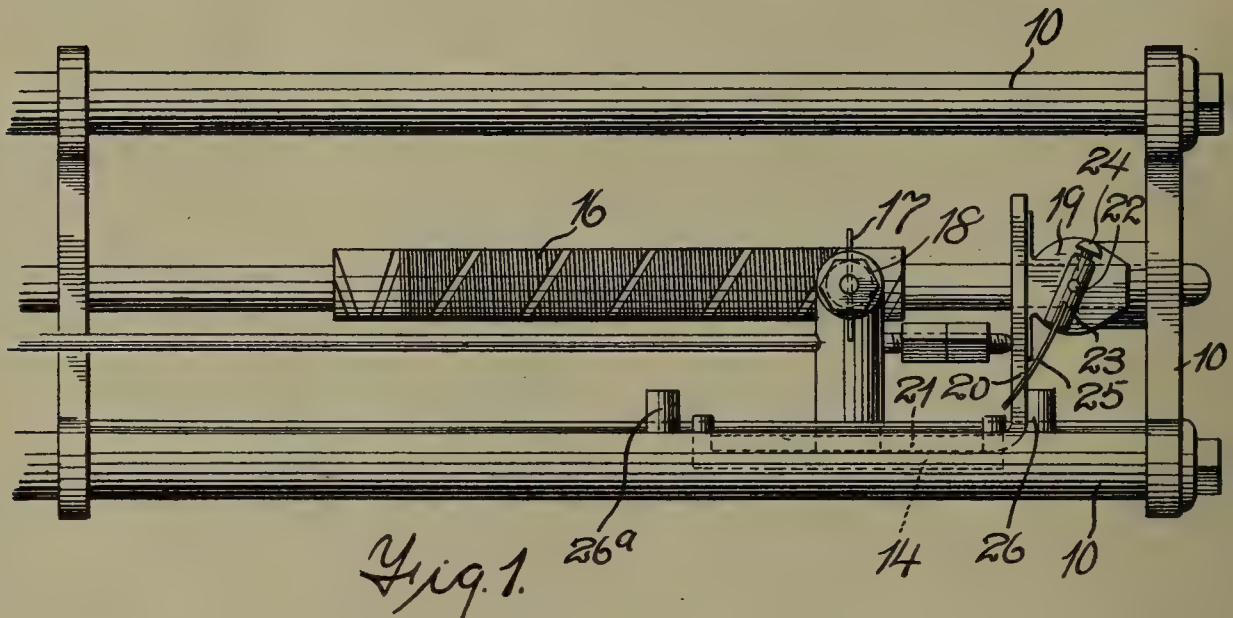
No. 883,970.

PATENTED APR. 7, 1908.

J. ROEVER.

REGISTERING MECHANISM FOR MULTIPLE PHONOGRAPHS.

APPLICATION FILED MAY 29, 1907.



WITNESSES:

Frank L. Smith.

Ralph Lancaster

INVENTOR:

BY Julius Roever
W. B. Hutchinson.
ATTORNEY.

UNITED STATES PATENT OFFICE.

JULIUS ROEVER, OF NEW YORK, N. Y., ASSIGNOR TO NATIONAL PATENT COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

REGISTERING MECHANISM FOR MULTIPLE PHONOGRAPHS.

No. 883,970.

Specification of Letters Patent.

Patented April 7, 1908.

Application filed May 29, 1907. Serial No. 376,267.

To all whom it may concern:

Be it known that I, JULIUS ROEVER, of the city of New York, county of Kings, and State of New York, have invented a new and useful
5 Improvement in Registering Mechanism for Multiple Phonographs, of which the following is a full, clear, and exact description.

My invention relates to improvements in registering devices and attachments for use
10 in connection with multiple phonographs, and especially with machines of this class which are operated by mechanism controlled by coins. In machines of this class it is desirable, and in fact necessary, that an accurate register be made of all coins dropped into
15 the machine to start the mechanism and play a record. In machines of this kind, a series of records are used, and a reproducer, generally on some kind of carriage, is made to traverse the length of a record and then move
20 back into position to traverse another record.

The object of my invention is to apply a registering device which shall be operated in connection with the sliding of the reproducer, so that the sliding of the reproducer in
25 one direction will operate the register. In this way there can be no cheating the register, and the result is more certain than it would be if the register were applied to some
30 other parts of the machine, and moreover, the arrangement, as will be noticed by the description to follow, makes it a very simple matter to connect up and apply the register.

With these ends in view, my invention consists of certain features of construction and combinations of parts which will be herein-
35 after described and claimed.

Reference is to be had to the accompanying drawing forming a part of this specification, in which similar reference characters indicate corresponding parts in all the views.

Figure 1 is a side elevation of a part of a machine showing my improvements, and Fig. 2 is a cross sectional elevation of the structure shown in Fig. 1.
45

In the drawings I have shown merely enough of the machine to show the application of the register and the means for operating it. The register is used generally in connection with a horizontal frame 10, which is supported on a post 11, or equivalent support, and extends over the top of a record wheel 12, in which the records 13 are carried. A reproducer carriage 14 slides back and
55 forth on the frame 10, so that the reproducer

15 may be operated from one of the records, which connects with the reproducer by a stylus, as usual. The carriage 14 is operated as shown by a screw 16, which connects with a blade 17 carried by the support 18 on the carriage 14, but so far as my invention is concerned it is immaterial how the carriage 14 is operated so long as it or its equivalent slides back and forth with relation to a record 13. 60

The register proper 19 may be of any approved type, and I have shown a common form of register which is carried on an arm 20, and this is bent to form a base portion 21 which is secured to the frame. The register is of the kind in which the mechanism is worked by the oscillating of its shaft 22, and I have shown this shaft provided with a flexible crank or arm comprising the part 23, which is secured to the shaft 22 by a binding screw 24 and the flexible or spring extension 25, which extends downward from the part 23, so as to strike the abutment 26 or 26^a as the case may be. These abutments are spaced apart directly in the path of the arm 25, which as will be seen, moves with the reproducer and its carriage, and the distance between the abutments is such that when the reproducer has traversed a record and is brought to the end of its stroke, the arm 25 strikes the abutment 26 and sets the register, and when the reproducer moves back to go over another record, the arm strikes the abutment 26^a, and the shaft 22 is turned so as to register one coin. Obviously, the arrangement can be reversed, that is, the register can be operated by contact of the arm with the abutment 26, instead of with the abutment 26^a, and it is equally obvious that the particular construction of the arm 25 and its connections, can be departed from without affecting the principle of the invention, which lies in having the operating arm of the register carried with the reproducer so that every complete stroke of the reproducer is sure to be recorded. The arm 25 should, however, be flexible, so as to avoid any undue strain on the register. 65 70 75 80 85 90 95 100

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent:— 105

1. In a machine of the kind described having a reproducer arranged to move opposite a record, the combination with such reproducer of a register movable back and forth 110

with the reproducer, abutments spaced apart, and a contact arm connected with the register to operate it and arranged to strike it.

2. In a machine of the kind described having a reciprocating reproducer, the combination with such reproducer, of a contact arm moving with the reproducer, abutments arranged in the path of the arm to operate it, and a register operatively connected with the contact arm.

3. In a machine of the kind described having a reciprocating reproducer, the combination with such reproducer of the register having a fixed relation thereto and sliding therewith, a flexible contact arm to operate the

reproducer, and abutments spaced apart to engage the contact arm near the ends of the reproducer stroke.

4. In a machine of the kind described having a reciprocating reproducer and carriage, the combination with the carriage of a register carried thereby, a contact arm connected with the register, and fixed abutments spaced apart so as to engage the contact arm near the ends of the carriage movement.

JULIUS ROEVER.

Witnesses:

H. A. WILSON,

W. B. HUTCHINSON.

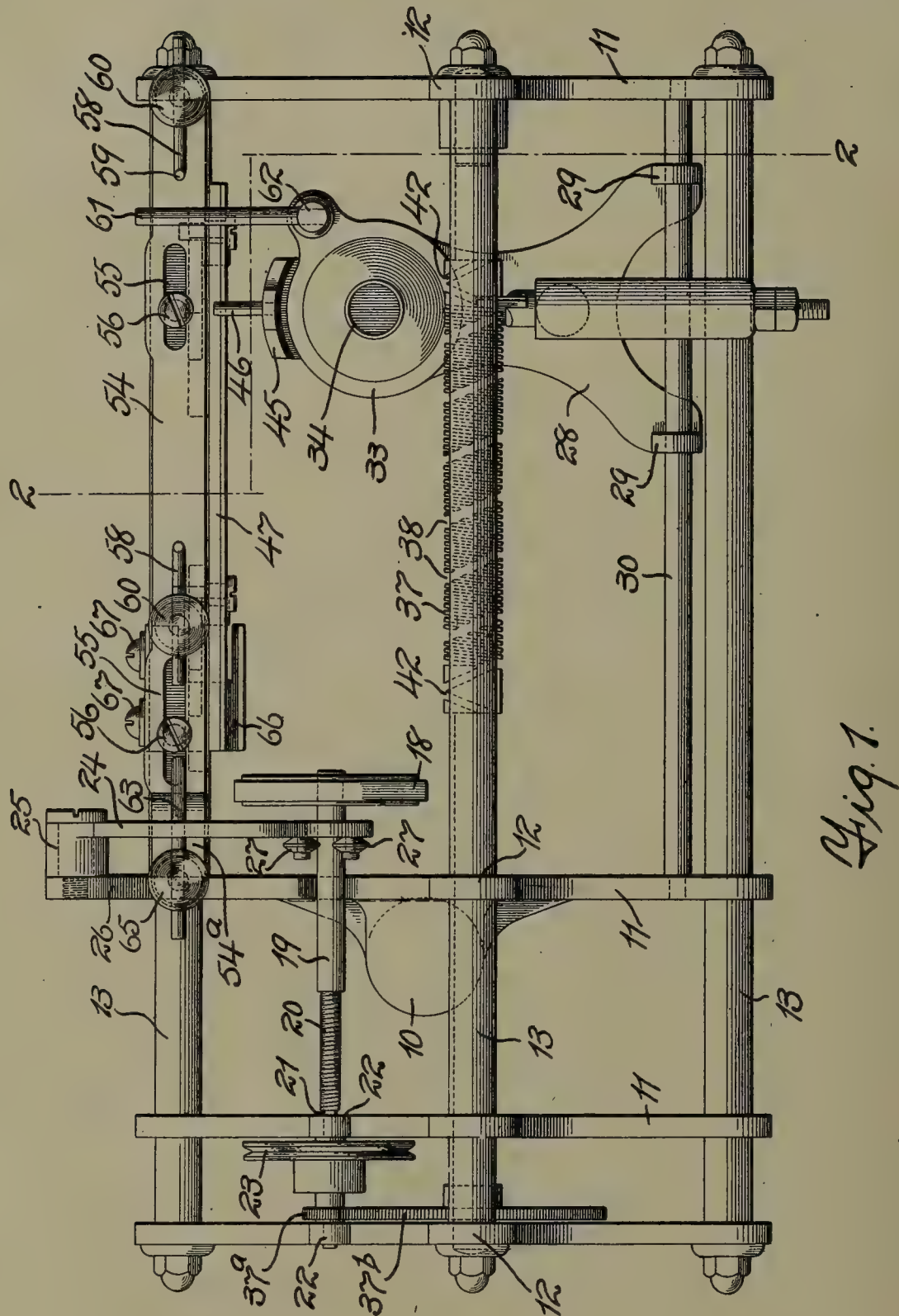
No. 883,971.

PATENTED APR. 7, 1908.

J. ROEVER.
MULTIPLE PHONOGRAPH MACHINE.

APPLICATION FILED MAY 29, 1907.

3 SHEETS—SHEET 1.

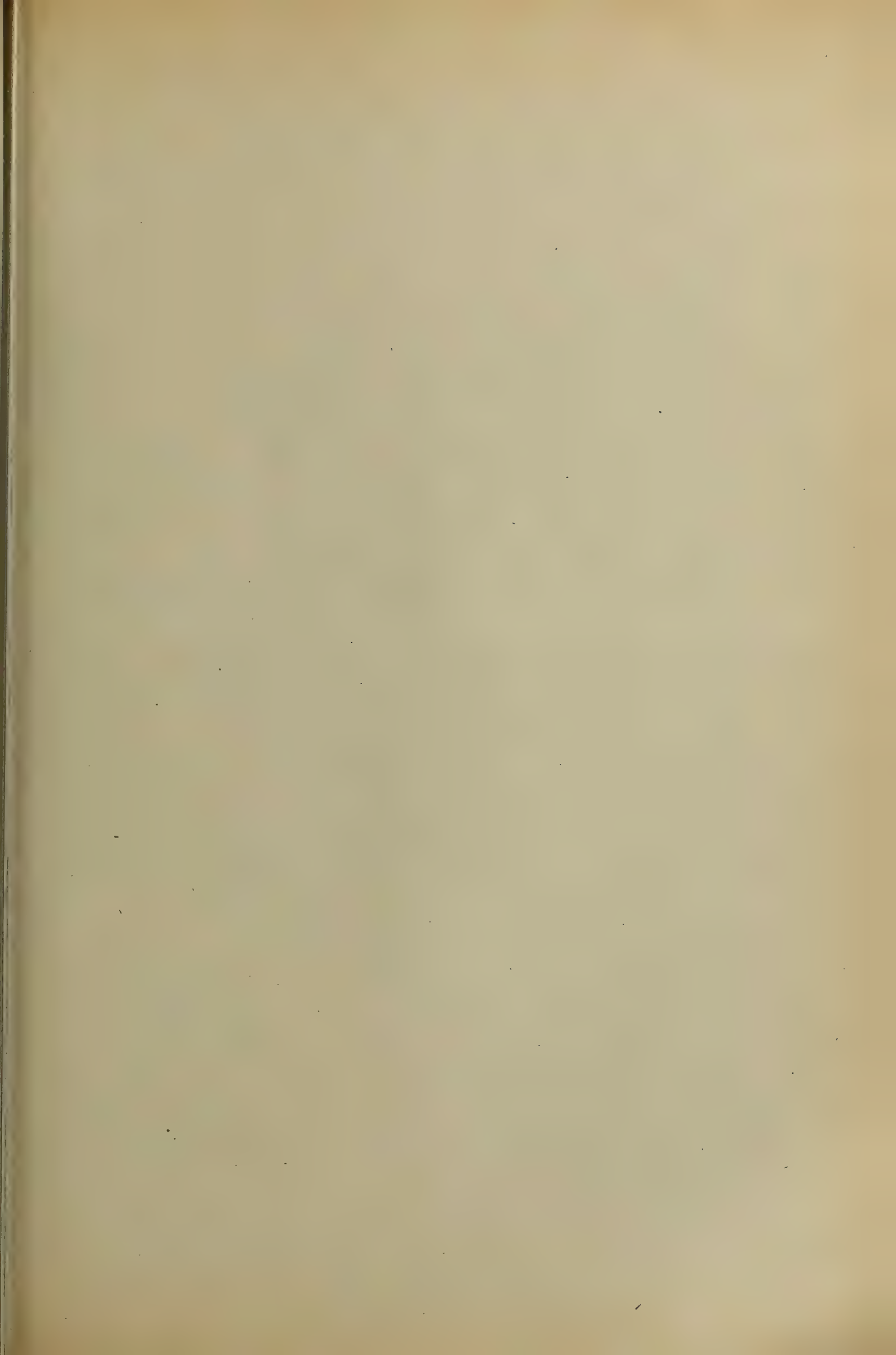


WITNESSES:

Ralph Lancaster
Frank L. Stubbs.

INVENTOR.

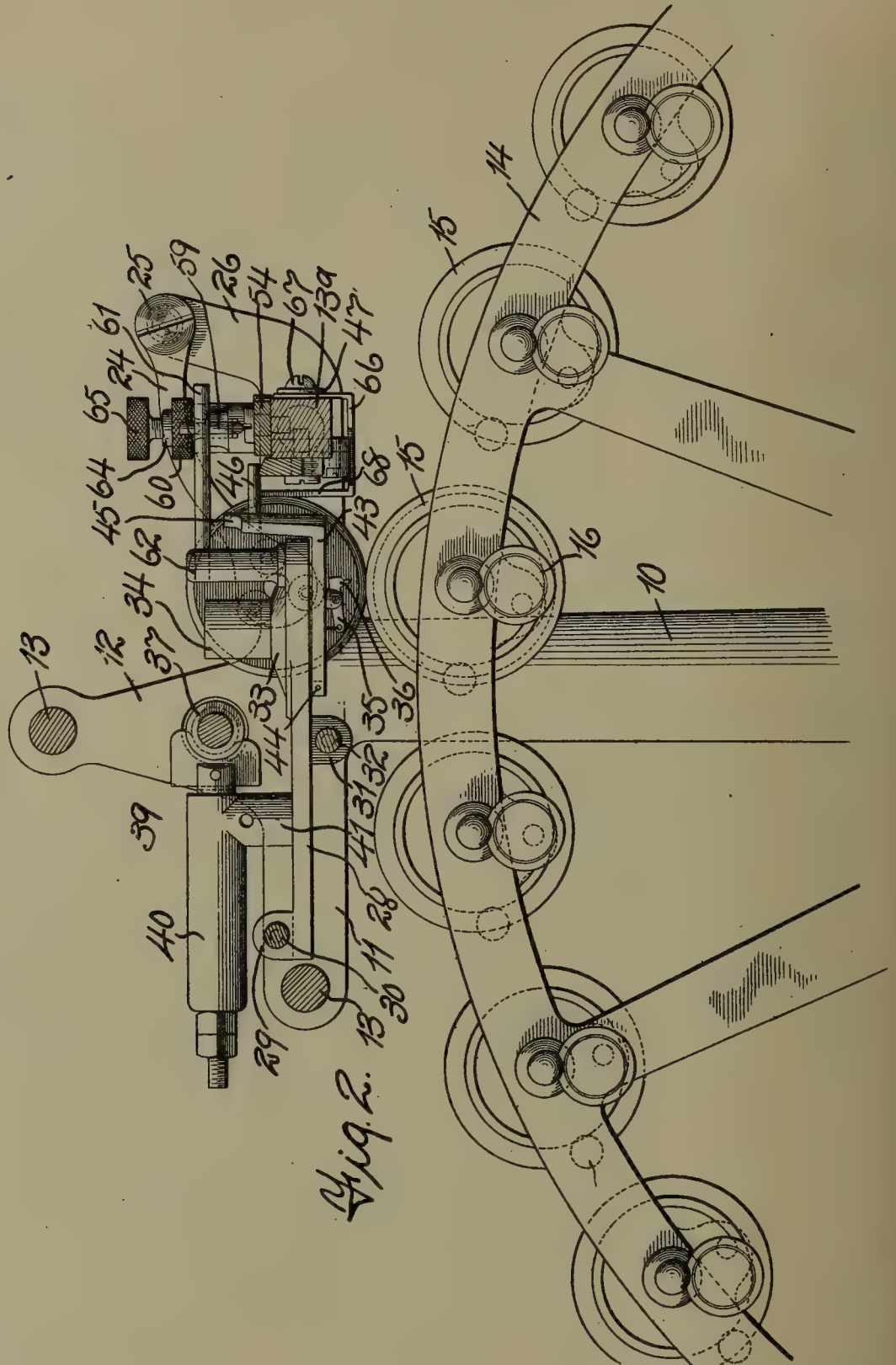
BY *Julius Roever.*
W. B. Hutchinson.
ATTORNEY.



J. ROEVER.
MULTIPLE PHONOGRAPH MACHINE.

APPLICATION FILED MAY 29, 1907.

3 SHEETS—SHEET 2.

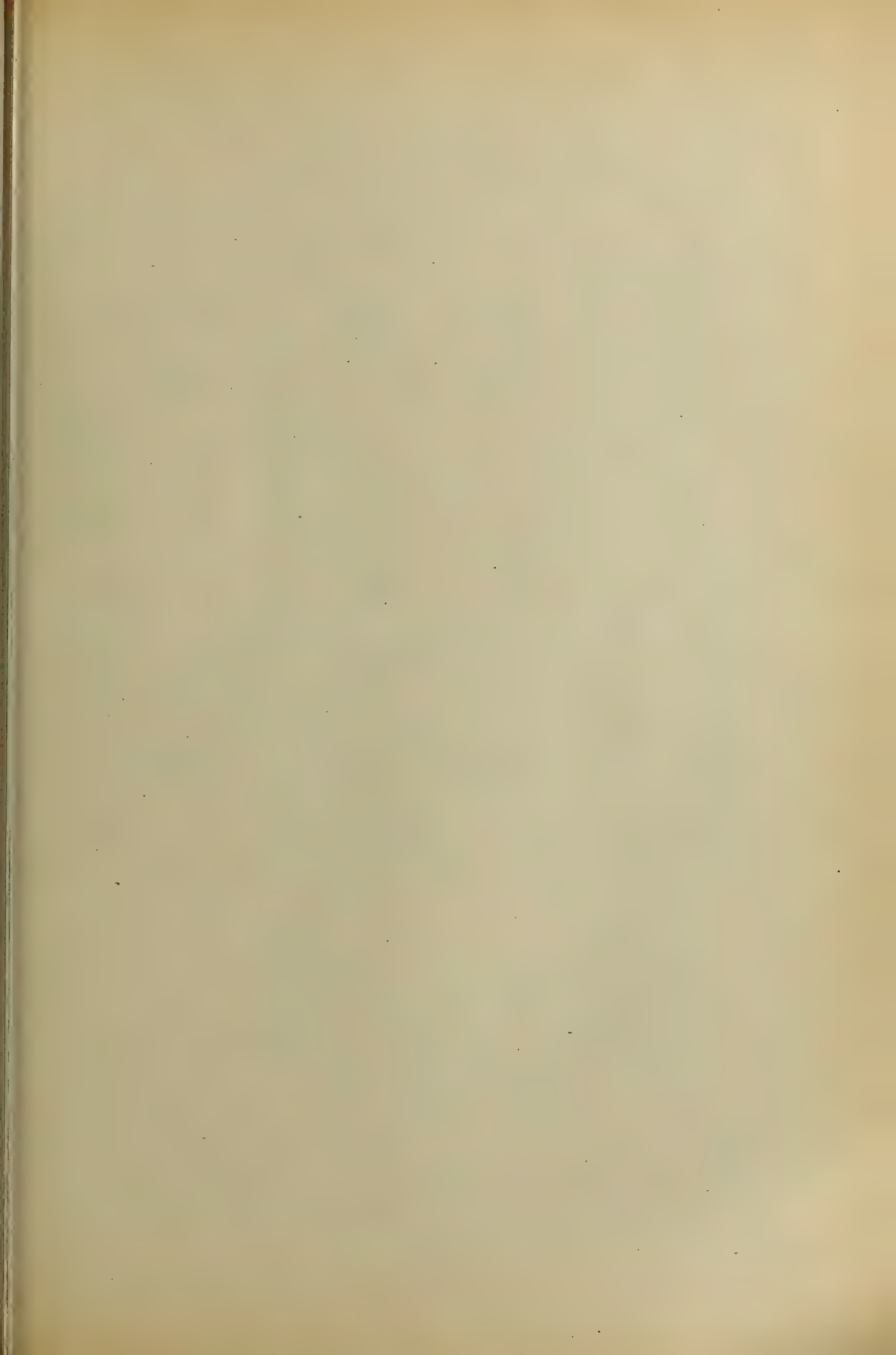


WITNESSES:

Ralph Lancaster
Frank L. Smith

INVENTOR.

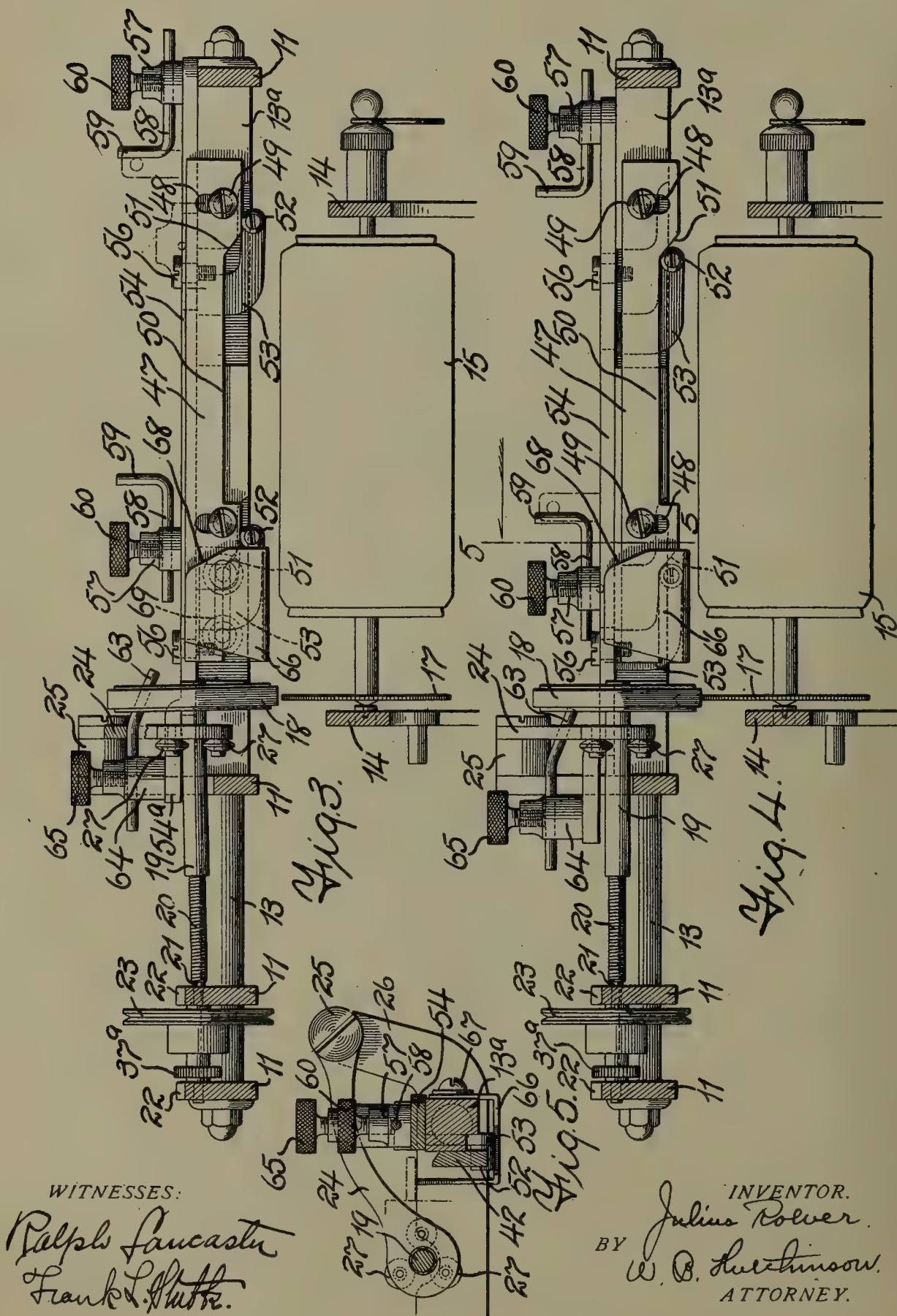
BY *Julius Roever*
W. B. Hutchinson
ATTORNEY.



J. ROEVER.
MULTIPLE PHONOGRAPH MACHINE.

APPLICATION FILED MAY 29, 1907.

3 SHEETS—SHEET 3.



WITNESSES:

Ralph Lancaster
Frank L. Shultz.

INVENTOR.

BY Julius Roever.
W. B. Hutchinson.
ATTORNEY.

UNITED STATES PATENT OFFICE.

JULIUS ROEVER, OF NEW YORK, N. Y., ASSIGNOR TO NATIONAL PATENT COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

MULTIPLE PHONOGRAPH-MACHINE.

No. 883,971.

Specification of Letters Patent.

Patented April 7, 1908.

Application filed May 29, 1907. Serial No. 376,270.

To all whom it may concern:

Be it known that I, JULIUS ROEVER, of the city of New York, county of Kings, and State of New York, have invented a new and useful Improvement in Multiple Phonograph-Machines, of which the following is a full, clear, and exact description.

My invention relates to improvements in multiple phonographs, and especially to machines of this class which have different trade names, but in which a wheel, carrying peripherally a quantity of cylindrical records, is actuated so as to bring the several records beneath the stylus of the reproducer, and in which mechanism is used for carrying the reproducer along in a direction parallel with the record which is being played upon.

My invention relates more especially to machines of this class in which the reproducer has a constant relation to the record, but the stylus is lifted out of engagement with the record or dropped to engagement, as required. Heretofore in machines of this character there has been considerable complexity in the mechanism for actuating the machine for moving the reproducer along in a direction parallel with the record, and especially in the means for lifting the stylus out of engagement with the record and dropping it back to place. In some cases spring frames of various kinds have been used to hold the driving mechanism in proper relation with the record to be driven, and a complicated system of levers has been used to lift and drop the stylus.

This particular invention is especially intended to overcome some of the difficulties above named, and produce a simple mechanical mechanism for driving the record, for permitting the driving mechanism to be placed in and out of engagement with the record to be driven, and for actuating the stylus, that is to raise and lower it as desired.

My invention also provides for automatically disengaging the driving mechanism of a record at the same time the stylus is lifted. I also provide a simple means for dropping the stylus at the exact point required in any record, so that when it is dropped the playing begins immediately and after the record is started sufficiently to make the pitch and time correct.

With these ends in view my invention consists of certain improvements in multiple phonograph construction, which will be here-

inafter described and the novel features claimed.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar reference characters indicate corresponding parts in all the views.

Figure 1 is a plan view of the structure embodying my invention. Fig. 2 is a cross section on the line 2—2 of Fig. 1, and showing also a segment of the record wheel with a series of records thereon. Fig. 3 is a longitudinal section partly in elevation of my improved structure, showing a part of the record wheel, and in proper relation thereto, and with the driving mechanism out of engagement with the record to be driven. Fig. 4 is a similar view to Fig. 3, but with the driving parts in engagement, and Fig. 5 is a cross section on the line 5—5 of Fig. 4.

In the drawings I have shown my invention supported on a post 10, which carries a horizontal frame extending above the top of the record wheel, to be presently referred to, said frame comprising the cross bars 11, the vertical arms 12, and the tie rods 13, which extend longitudinally, and one of which is preferably squared as shown at 13^a, to provide for conveniently attaching certain parts to be hereinafter described. This frame extends horizontally over the top of the record wheel 14, which, so far as this particular invention is concerned, can be of any approved character, and which carries a peripheral series of individually rotatable records 15 of the usual kind, these having disks 16 attached, by which they can be numbered and identified. My invention relates, however, wholly to the matter carried by the frame above referred to and described below. This frame carries driving mechanism which engages a disk 17 on the spindle of each record 15, as the latter is brought to place, and as shown the disk 17 is driven by the friction wheel 18, which is carried by a flexible shaft comprising the sections 19, 20 and 21. The rigid section 19 has a socket in one end to receive the spiral section 20, which couples onto the section 21, and this is mounted in suitable bearings 22 in two of the cross-bars 11. The flexible driving shaft just described is driven by a pulley 23, or equivalent driving means, and the pulley can connect with any suitable motor or source of power. It will be observed that to disengage the driving mechanism it is simply necessary to lift

the friction wheel 18 from the disk 17, and in this way I obviate the necessity of using spring frames and other structures such as have been heretofore used.

- 5 To provide for lifting the free end of the flexible shaft, the section 19 extends through the free end of the swinging arm 24 and this is pivoted as shown at 25 on the rigid arm 26 of the horizontal frame above referred to.
- 10 To provide for the necessary freedom of movement, the hole through the arm 24 is rather large, and the shaft 19 is centered and journaled between the anti-friction rollers 27 which are pivoted in the arm 24. The frame
- 15 carries a reproducer carriage 28, which has a movement longitudinal of the frame and parallel with the several records 15, and the carriage can be mounted in any convenient way. As shown it has ears 29 sliding on a guide rod
- 20 30, and an ear 31 on the under side sliding on a guide rod 32, as shown clearly in Fig. 2. The carriage supports a reproducer 33, which can be of any approved kind, having the usual top part 34 to connect with a horn.
- 25 The reproducer is stationary with relation to the carriage 28, and it supports a tilting lever 35, which has a stylus 36 to connect with the record, and which is carried by a plate 43, to be presently referred to. The carriage 28 is
- 30 moved backward and forward from a screw 37, which has the regulation thread to move the carriage forward, and a coarse cross thread 38 to effect a quick return of the carriage. This arrangement is not claimed as
- 35 new. The screw connects with the driving shaft by gears 37^a and 37^b, and the thread of the screw engages a blade 39, the shank of which is held in the support 40, which is secured to a post 41 on the carriage 28, and as
- 40 the blade follows the thread of the screw the carriage is moved forward or backward, as the case may be. When the blade reaches the end of the screw it is guided into engagement with the necessary thread by the cam
- 45 mechanism 42, and this is not here claimed. The reproducer stylus is carried by a drop lever or plate 43, which is pivoted to the carriage 28 at one end as shown at 44 in Fig. 2, and at its free end the plate has an upwardly
- 50 extending flange 45, to which is secured an arm 46, which rides on the thin upper edge of the plate 47, by which the rise and fall of the plate 43 is regulated. Obviously the plate 43 can be given any desired configura-
- 55 tion, so long as its free end has an engagement with the plate 47. The plate 47 has a vertical movement on the squared part 13^a of the frame, and to provide for this vertical movement the plate has slots 48 which receive screws 49, and these enter the part 13^a
- 60 just referred to. The plate 47 is narrower at the middle than at the ends, as shown at 50 in Figs. 3 and 4, and to provide for raising and lowering the plate it has cams 51 near
- 65 the ends, which engage the rollers 52 on the

arms 53, and these extend downward from the top plate 54, which slides longitudinally on the part 13^a. The movement of the top plate is limited by screws 56 which extend through slots 55 in the top plate as shown in Fig. 1. On the top plate, preferably near the ends, are posts 57 which receive the abutment rods 58, which have upturned ends 59 to engage the striking arm hereinafter referred to, and the rods 58 can be adjusted and are held in place by the binding screws 60. The bent ends 59 of the rods 58 are struck by the striking arm 61, which is carried by the post 62 on the carriage 28. It will be seen that by this action the plate 54 is in one instance moved to the right, in which case the rollers 52 striking the cam 51, lift the plate 47, and the free end of the plate 43, so as to bring the stylus 36 out of engagement with the record. This occurs when a record has been traversed and a tune has been played. When, however, the carriage 28 reaches the end of its return stroke, the arm 61 strikes the opposite or left hand rod 58, the plate 54 moves in the opposite direction, and the plate 47 and the plate 43 are dropped so as to bring the stylus into engagement with a record. It is desirable to have the driving mechanism of the record disengaged at the same time that the stylus is raised from the record, and to this end a cam 63 in the shape of a bent rod, is secured to the post 64 by means of the binding screw 65, the said post being on the raised end 54^a of the plate 54. This bent rod 63 is arranged to extend underneath the arm 24, and so just as the stylus is lifted, in the manner already described, the arm 24 is also raised, and the friction wheel 28 lifted out of engagement with the disk 17.

In order that the stylus may drop in the right place and engage the record after the latter has started, and also in such a way that the stylus will not drag along the record, I use a gage which as shown is in the form of a U shaped clip 66, which is fastened to the outer side of the part 13^a of the frame by screws 67, and the clip extends beneath the part 13^a and then upward parallel with the plate 47. The inner side of the clip is inclined as at 68, and when the plate 47 drops so as to drop the stylus into engagement with a record, the arm 46 strikes the inclined part 68, and is thereby guided so as to push the carriage 28 slightly and bring the stylus into the correct place. The gage 66 is longitudinally adjustable in order that the above result may be best attained, and an easy means of adjustment is shown in Fig. 3 in dotted lines, in which the gage has a longitudinal slot 69 to receive the screws 67. Obviously the gage can be differently made, and the essential thing is simply to have the inclined surface engage the part 46 and regulate the dropping position of the stylus 36.

From the foregoing description it will be seen that I have shown a very practical and simple means of accomplishing the results at first referred to, that is to say, the dropping
 5 of the plate 47 permits the friction wheel 18 to engage the part 17, and as soon as the disk is started well, the stylus is dropped into engagement with the record 15. It will also be noticed that I have good means of lifting and
 10 dropping the stylus, and that when the record has been traversed, the driving parts are automatically disengaged.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent:—

1. In a machine of the kind described, the combination with the record wheel and the records thereon, of a flexible shaft connected with a source of power and having an operative
 20 connection with each record, and means for breaking the driving connection between the shaft and the record by flexing the said flexible shaft.

2. A machine of the kind described, having a record wheel carrying a series of records, a reproducer arranged to travel opposite a record, a flexible driving shaft having an operative connection with the records, and automatic means for moving the shaft
 30 and breaking the driving connection by the movement of the reproducer.

3. The combination with the record wheel and the records thereon, of a flexible driving shaft operatively connected with the records to drive them, a reproducer arranged to travel opposite a record, and a cam mechanism actuated by the movement of the reproducer to move the flexible shaft and break
 35 the driving connection.

4. The combination with the record wheel and the records thereon, of a flexible driving shaft operatively connected with the records, a movable arm supporting the free end of the shaft, a reproducer moving opposite the record, and means actuated by the movement
 45 of the reproducer to move the aforesaid arm and shaft, thereby breaking the driving connection.

5. The combination with the record wheel and the records thereon, of the flexible driving shaft operatively connected with the records to drive them, a swinging arm supporting the free end of the said shaft, a cam mechanism to engage and lift the arm, a reproducer movable along a record, and means for operating the cam mechanism by the movement of the reproducer.

6. A machine of the kind described, comprising means for supporting a series of records and a driving disk for each record, a flexible shaft having an operative connection with the driving disk, a reproducer movable opposite a record and having a stylus movable in and out with relation to the record, means for lifting the stylus after it traverses

a record, and means acting in conjunction with the stylus lifting mechanism to disengage the driving shaft from a record disk.

7. A machine of the kind described, comprising a series of records, driving mechanism supported opposite the records and adapted to operatively connect with each record, a reproducer having a movable stylus, said reproducer moving opposite a record, and means actuated by the movement
 70 of the reproducer to engage and disengage the stylus with the record and at the same time engage or disengage the driving connection with the record.

8. A machine of the kind described, comprising means for carrying a series of records opposite a supporting frame, driving means on the frame to engage each record, a reproducer held to slide on the frame, said reproducer having a stylus movable in and out
 85 with relation to the record, a plate movable in and out with relation to the record, said plate being arranged to lift or drop the stylus, and means for moving the plate by the movement of the reproducer carriage, said means serving also to control the driving connection with the record.

9. The combination with the movable series of records, of the reproducer movable opposite each record and having a stylus movable in and out with relation to the record, a slide plate arranged to support the stylus, and cam mechanism operated by the movement of the reproducer to move the slide plate in and out.

10. The combination with the records arranged in series, of a reproducer carriage held to slide opposite the record, a reproducer on the carriage having a movable stylus to engage the record, a slide plate movable in and out with relation to the record, abutments struck by the movement of the carriage near the ends of its stroke, and operative connections between the abutments and the slide plate.

11. The combination with the records arranged in series, each being independently driven, of a flexible driving shaft adapted to drive each record, a reproducer movable opposite a record and having a stylus movable with relation to the record, abutments actuated by the movement of the reproducer near the ends of its stroke, means operated by the abutments to move the stylus in and out, and means also operated from the abutments for moving the flexible shaft and breaking the driving connection with a record.

12. The combination with a record and the carriage sliding opposite the record, of a reproducer on the carriage, said reproducer having a stylus movable in relation to the record, a slide plate movable in and out with relation to the record, said slide plate having cam surfaces, movable abutments operated

by the carriage near the ends of its stroke; and an operative connection between the movable abutments and the cam surfaces for actuating the slide plate.

- 5 13. The combination with a record and its driving disk, of the flexible driving shaft having a driving connection between itself and the disk, a reproducer carriage movable opposite the record, a reproducer on the car-
10 riage, said reproducer having a stylus movable with relation to the record, a plate slidable parallel with the movement of the car-

riage, means for moving the slidable plate near the ends of the carriage stroke, means actuated by the movement of the slidable 15 plate for engaging or disengaging the stylus with its record, and means also actuated by the slidable plate to disengage the driving shaft from its disk.

JULIUS ROEVER.

Witnesses:

H. A. WILSON,
W. B. HUTCHINSON.

No. 884,062.

PATENTED APR. 7, 1908.

H. BALDWIN.
PHONOGRAPH REPRODUCER.
APPLICATION FILED DEC. 6, 1907.

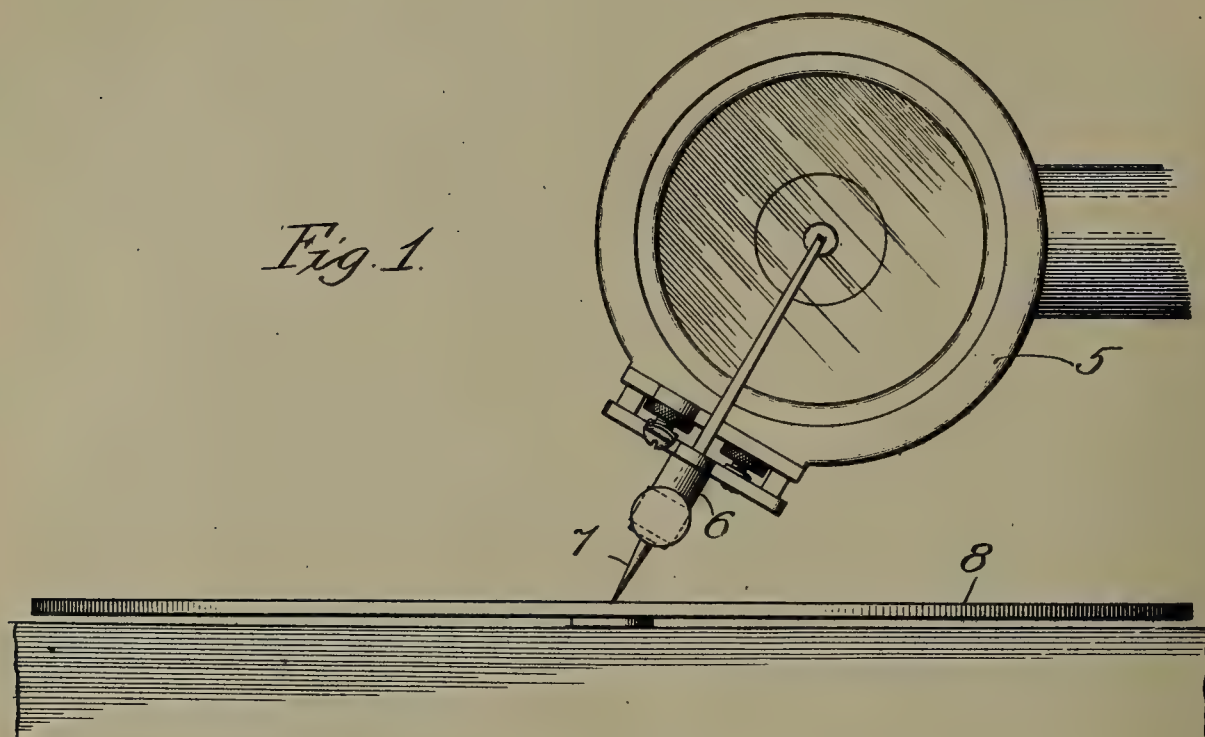


Fig. 2.

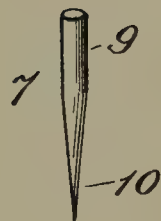


Fig. 3.

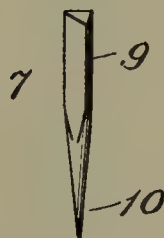
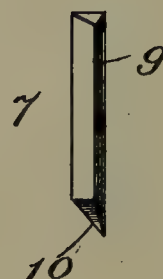


Fig. 4.



Witnesses:
Ed. Gaylord.
John Enders

Inventor:
Hiram Baldwin.
By *Dyrenforth, Lee, Chittenden & Wiles*
Attys. #

UNITED STATES PATENT OFFICE.

HIRAM BALDWIN, OF CHICAGO, ILLINOIS.

PHONOGRAPH-REPRODUCER.

No. 884,062.

Specification of Letters Patent.

Patented April 7, 1908.

Application filed December 6, 1907. Serial No. 405,312.

To all whom it may concern:

Be it known that I, HIRAM BALDWIN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Phonograph-Reproducers, of which the following is a specification.

The object of my invention is to provide a novel needle or stylus as the sound-reproducer of a phonograph or analogous instrument, which shall possess, as attributes, tone-improving qualities in the way of softness and freedom from noise from its contact with the record, and good sound-conductivity.

I have discovered that ivory is a substance affording in a high degree these attributes in the needle or stylus of a phonograph; and my invention, based on this discovery, consists in a reproducer-needle composed, as to its entirety or at least as to its attenuated portion, of ivory.

In the accompanying drawing, Figure 1 is a broken view showing a reproducer-head equipped with my improved needle applied to the ordinary disk-record of a phonograph; and Figs. 2, 3 and 4 are perspective views representing three of the various forms in which my improved needle may be provided.

The numeral 5 represents a reproducer-head of ordinary construction, involving a holder 6 for adjustably supporting a stylus 7 in operative position relative to a rotary disk-record 8. The stylus or needle consists of a stem-portion 9 and an attenuated portion 10 formed, preferably in its entirety, of ivory, in suitable shape, including the shapes represented; though it is within my inven-

tion to form only the attenuated portion of ivory. Furthermore I find it to be advantageous, as enhancing the attributes hereinbefore specified, to artificially harden the ivory of the stylus, particularly as to its attenuated portion, and this I have done by immersing it, for a brief period—say of an hour, more or less—in a saturated solution of chromic acid, though chromate of potash will serve the purpose, and thereupon drying the ivory.

What I claim as new and desire to secure by Letters Patent is:

1. The combination in a phonograph, with a reproducer-head, of a needle having its attenuated record-engaging portion composed of ivory.

2. The combination in a phonograph, with a reproducer-head, of a needle having its attenuated record-engaging portion composed of artificially-hardened ivory.

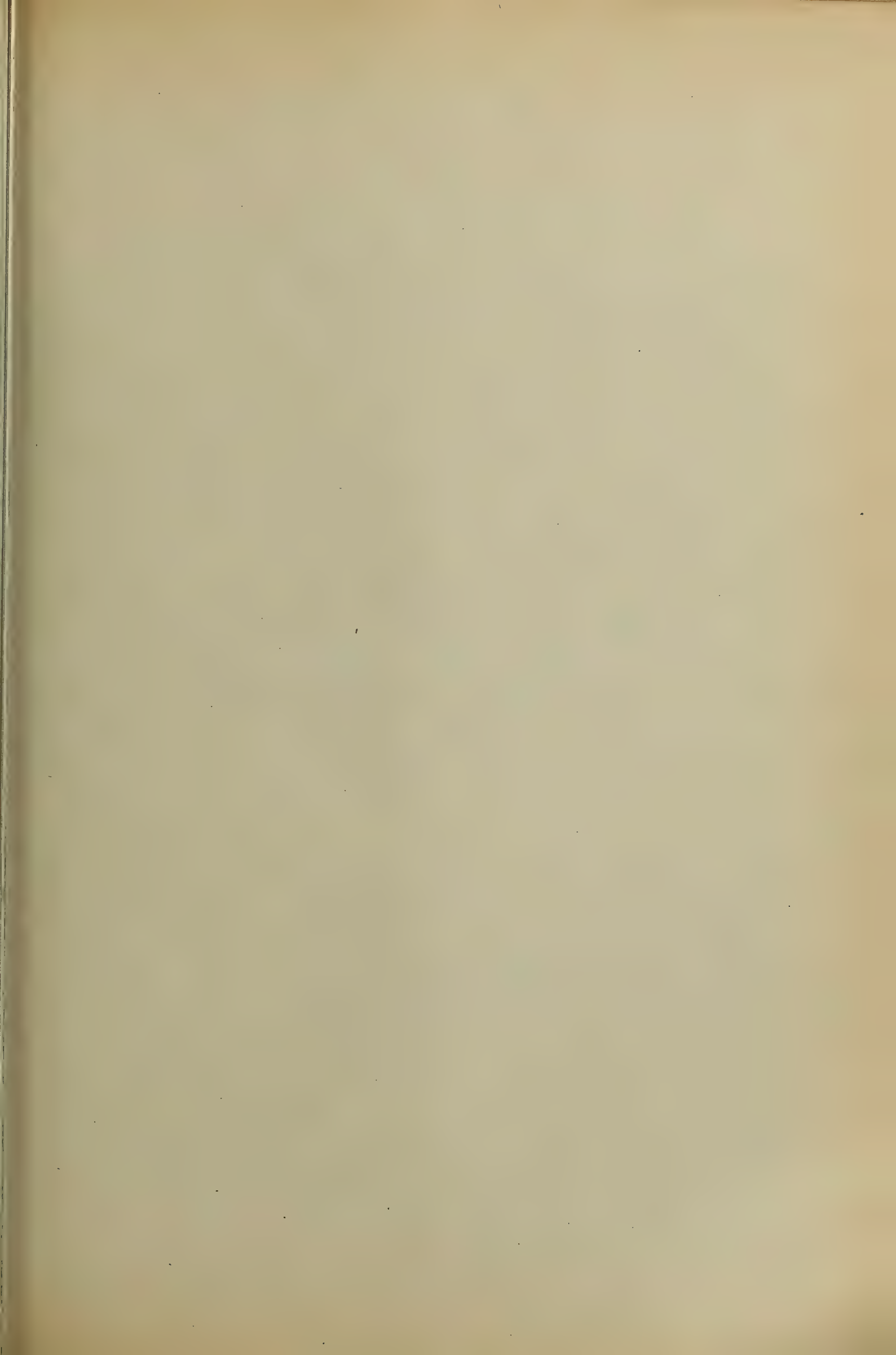
3. The combination in a phonograph, with a reproducer-head, of a needle consisting of a stem-portion at which it is supported on said head, and an attenuated record-engaging portion, said needle being composed in its entirety of ivory.

4. The combination in a phonograph, with a reproducer-head, of a needle consisting of a stem-portion at which it is supported on said head, and an attenuated record-engaging portion, said needle being composed in its entirety of artificially-hardened ivory.

HIRAM BALDWIN.

In presence of:

W. T. JONES,
RALPH SCHAEFER.



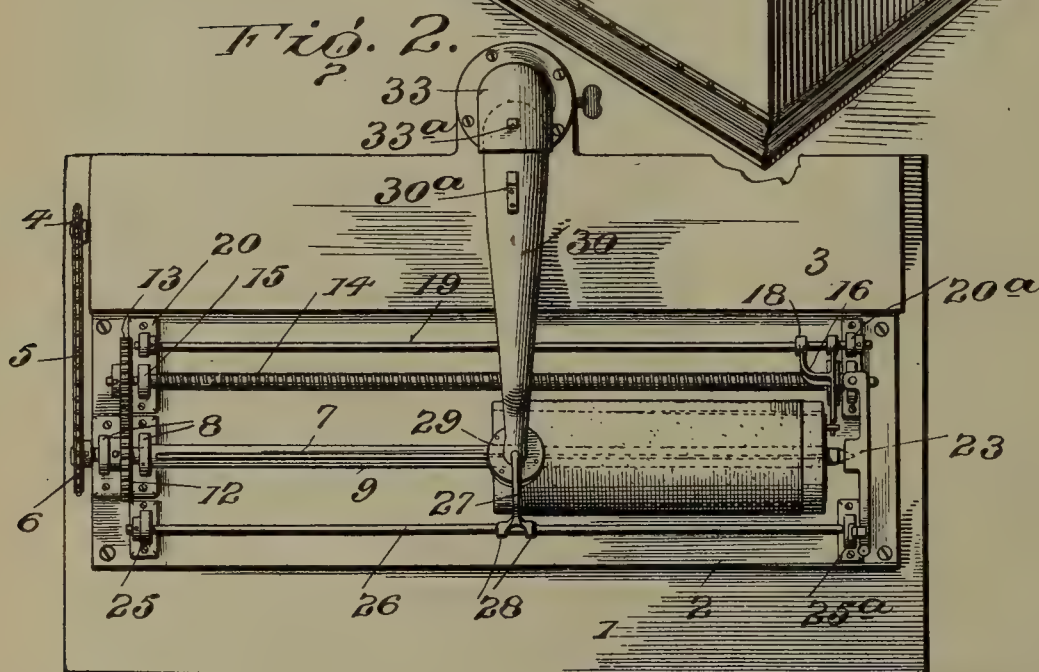
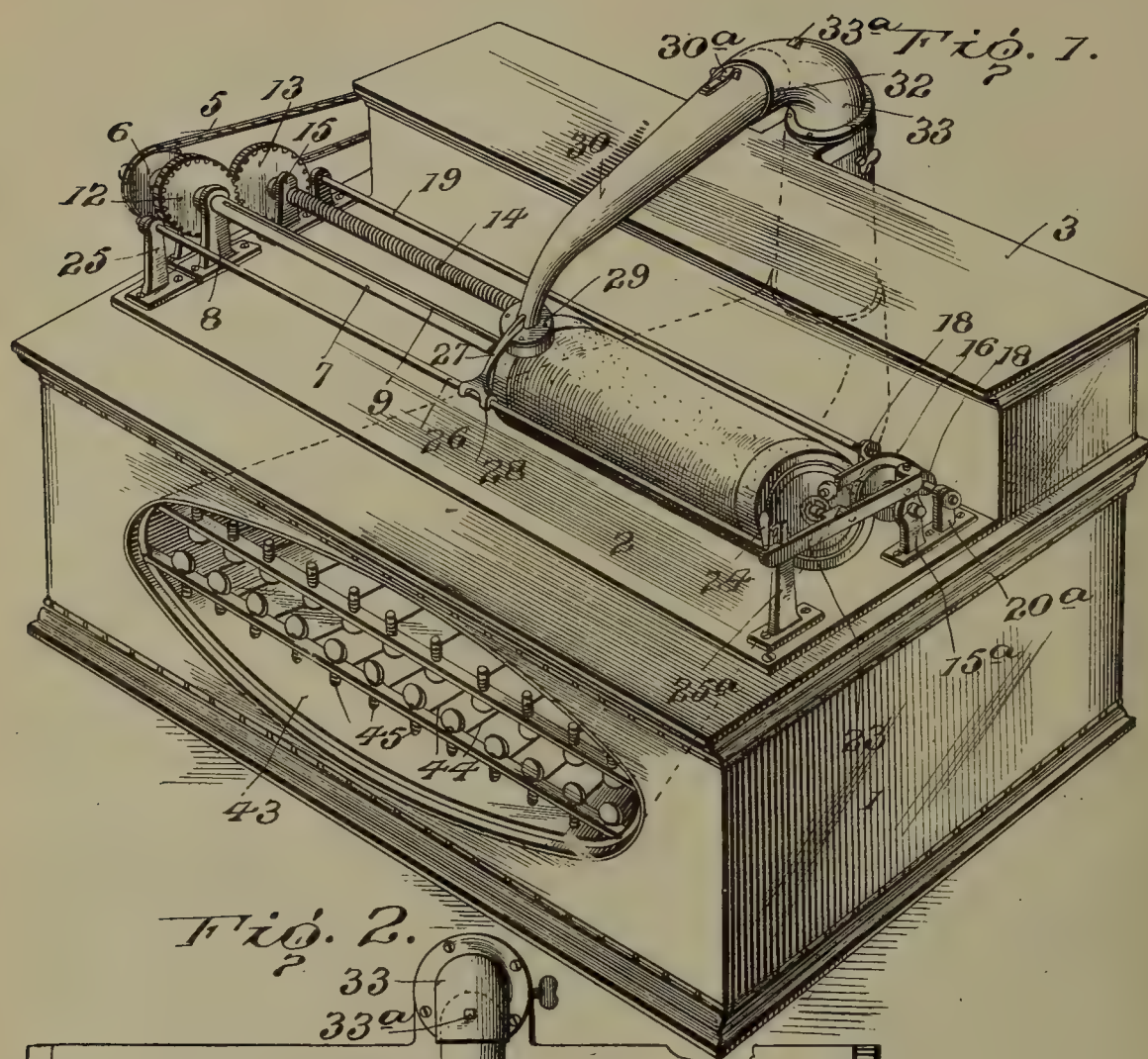
No. 884,216.

PATENTED APR. 7, 1908.

H. SCHRÖDER.
PHONOGRAPH.

APPLICATION FILED MAR. 2, 1907.

2 SHEETS—SHEET 1.



Inventor

H. Schröder

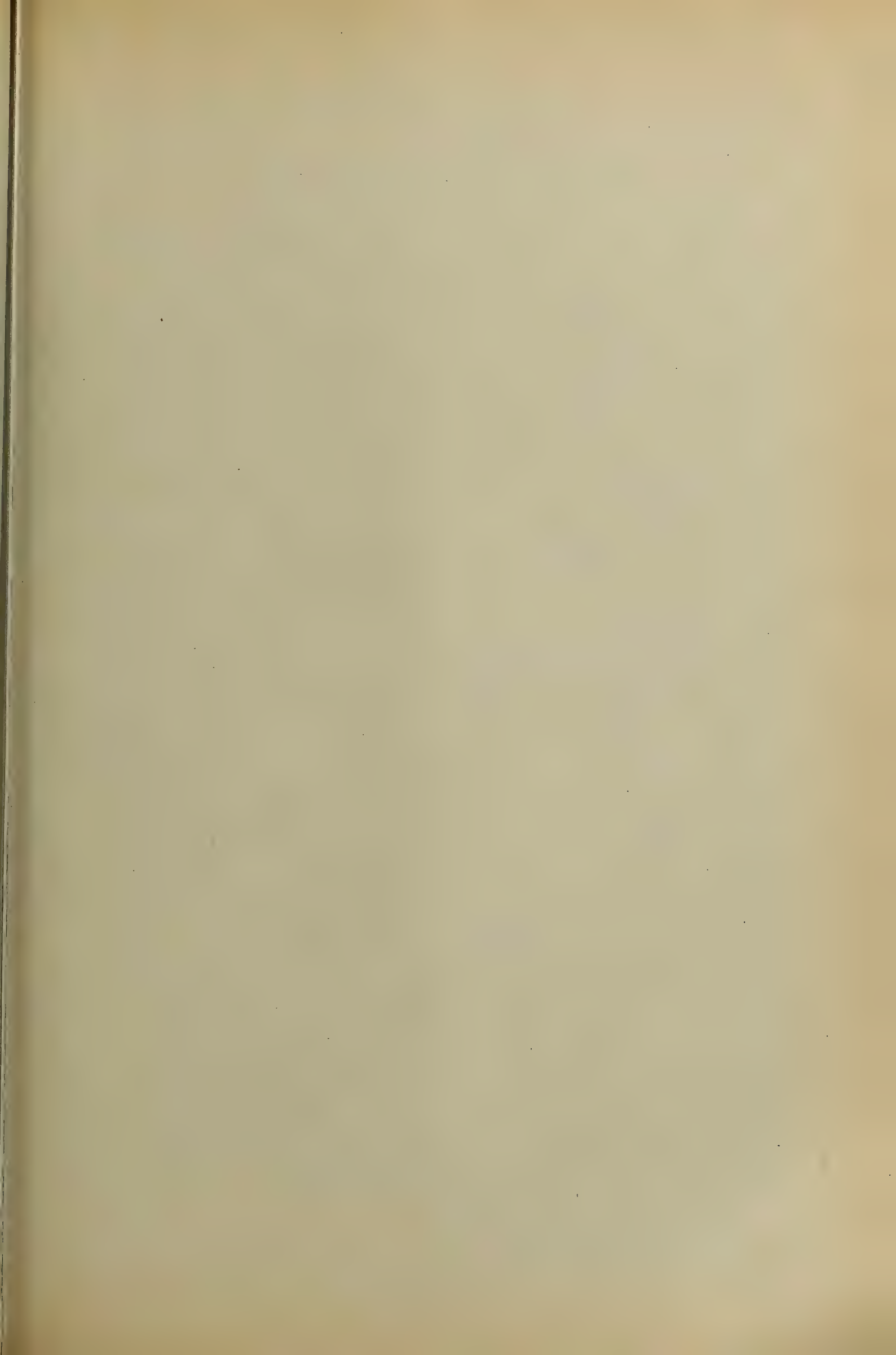
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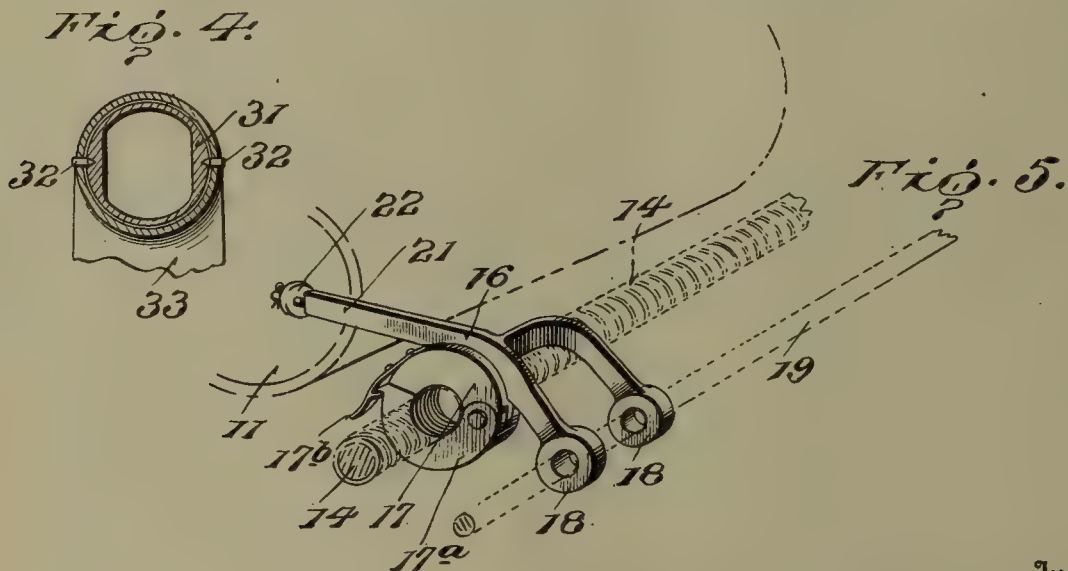
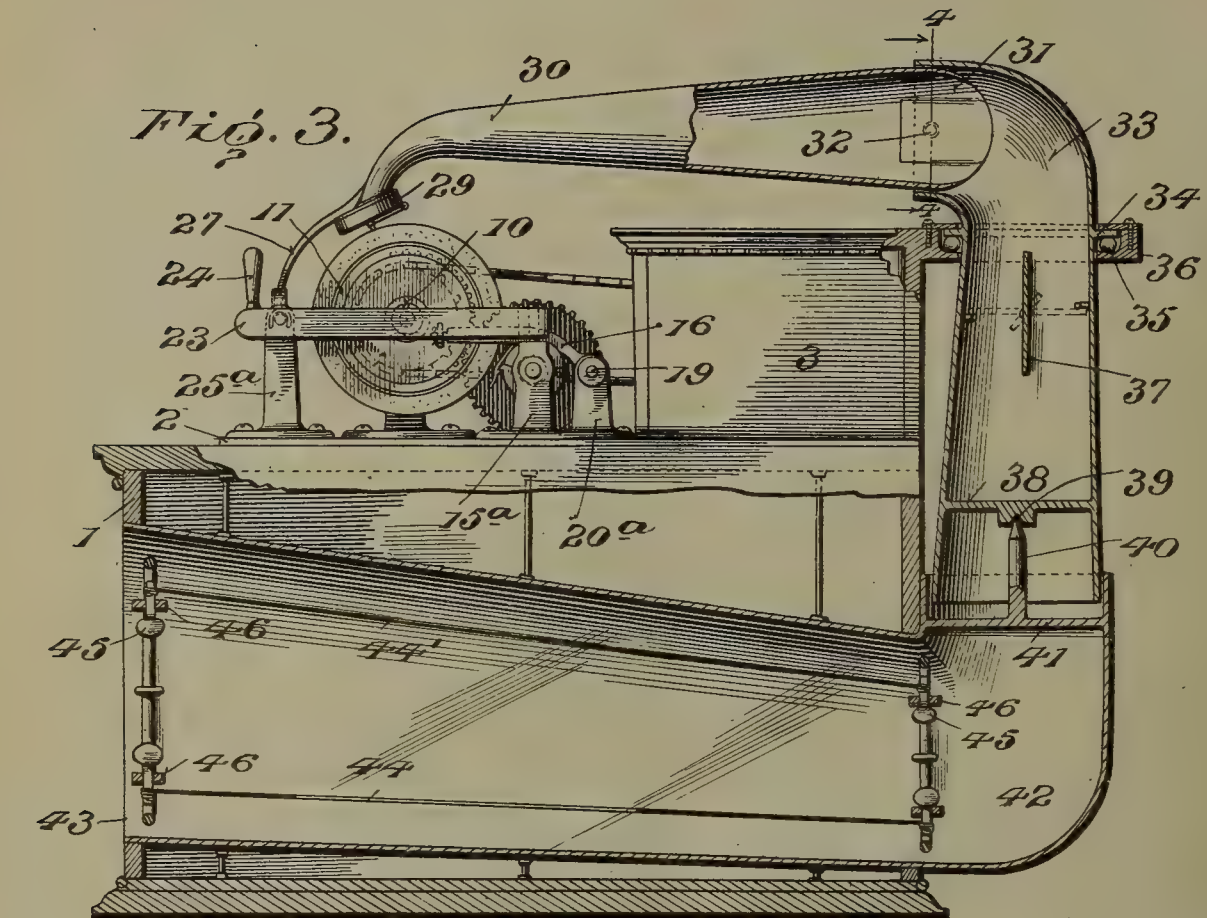
H. Schroder
Ph. M. Macy

Attorneys

Witnesses

W. A. Williams
W. Woodson





Witnesses

H. A. Williams
W. N. Woodson

Inventor
H. Schröder.

By *Ph. M. Lacy,*

Attorneys

UNITED STATES PATENT OFFICE.

HERMANN SCHRÖDER, OF NEW YORK, N. Y.

PHONOGRAPH.

No. 884,216.

Specification of Letters Patent.

Patented April 7, 1908.

Application filed March 2, 1907. Serial No. 360,158.

To all whom it may concern:

Be it known that I, HERMANN SCHRÖDER, subject of the German Emperor, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

This invention contemplates certain new and useful improvements in phonographs of that type that employ a record cylinder, and the invention has for its primary object an improved construction of actuating means whereby the needles or stylus is held relatively stationary, while the record cylinder is revolved underneath the same and fed longitudinally.

With this and other objects in view as will more fully appear as the description proceeds, the invention consists in certain constructions, arrangements and combinations of parts which I shall hereinafter specifically describe and then point out the novel features in the appended claims.

For a full understanding of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result, reference is to be had to the following description and accompanying drawings, in which:

Figure 1 is a perspective view of my improved phonograph; Fig. 2 is a top plan view thereof; Fig. 3 is a transverse sectional view with parts in side elevation; Fig. 4 is a detail sectional view on the line 4—4 of Fig. 3; and, Fig. 5 is a detail perspective view illustrating a portion of the feed screw and the carriage mounted thereon.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

Referring to the drawings, the numeral 1 designates the case or cabinet of my improved phonograph, 2 a stand or plate support, which may be secured to the top of the case 1 in any desired manner and which is designed to support parts of the mechanism hereinafter described, and 3 designates the motor case within which may be placed an electric, spring, or any other desired type of motor.

The motor shaft is intended to carry a sprocket wheel 4 that is connected by means of the chain 5 with the sprocket wheel 6 on the outer end of the shaft or spindle 7. This

shaft 7 is journaled at one end in a pair of standards 8 extending upwardly from the base or support 2, and the shaft is provided with a longitudinal slot or groove 9. Within this groove fit one or more feathers formed on the preferably tapering holder 11 for the record cylinder. By this means, the said holder may slide longitudinally on the shaft 7.

The shaft or spindle 7 carries at one end a spur pinion 12 which meshes with a similar pinion 13 on the end of a feed screw 14. The said screw is journaled in bearings on the upright standards 15 and 15^a. In order to advance the holder 11 along the shaft 7, as such shaft revolves, I provide a feed carriage 16 which embodies a clamp nut 17 working on the revoluble feed screw 14, a pair of spaced apertured ears 18 and a forwardly extending finger 21, the extremity of which carries a roller 22 adapted to bear against the flat end of the cylinder holder 11. The nut 17 is formed with a hinged section 17^a adapted to be held to the other section by means of a spring latch 17^b, so that the carriage may be disengaged from the feed screw 14 after it has completed its forward traverse and be slipped rapidly back to the starting point. The ears 18 are mounted to slide freely along a guide rod 19 that is supported at its ends on the standards 20, 20^a. It will be understood that the hinged section 17^a of the nut 17 may be swung downwardly from the upper section of the nut so as to permit the carriage 16 to be thrown upwardly and backwardly on the rod 19 as a pivot, to effect the disengagement of the carriage from the feed screw 14.

In order to provide for slipping the record on the holder 11, I provide a cross bar 23 which is hinged upon the standard 15^a and which is provided with a spring latch 24 adapted to engage another standard 25^a. This last named standard supports one end of the front guide rod 26 and the other end of said guide rod is secured in a standard 25.

27 designates a guide arm which is provided with two spaced fingers 28 adapted to rest upon the front guide rod 25, said arm being secured in any desired manner to or formed integral with the sound box 29 or casing for the diaphragm.

30 designates the tapered arm which is secured in the usual manner at one end to the sound box and which is pivoted at its opposite end 31 by means of set screw pivots 32

within the upper end of the elbow 33. The tapered arm 30 is thus pivoted to swing in a vertical plane, and when raised, it may be held in an elevated position by means of the engagement of a spring latch 30^a with a stud or keeper 33^a on the elbow 33.

The elbow 33 is provided with an angular flange 34 by which it is supported on a ring of antifriction balls 35 mounted in a race-way formed in a bracket 36 which preferably extends or projects rearwardly from the motor case 3. Below its flange 34, the elbow 33 may be provided with a damper 37, and at its lower end, the said elbow is provided with a cross bar 38 formed on its lower side with a socket 39. Within this socket there fits the upper pointed end of a pivot spindle 40 which is supported at the center of the cross bar 41 in the upper end of the upwardly extending rear end of the megaphone proper 43. The said megaphone and its extension or elbow 33 by which it is connected to the tapered arm 30 are all preferably of wood, and to assist in obtaining a mellow sound, the said megaphone is provided with a plurality of strings 44 that are preferably of gut, and that are supported at their ends by means of pegs 45 by which their tension may be adjusted. The strings 44 are preferably arranged in two sets, upper and lower, and their pegs are preferably mounted in cross bars 46.

In the practical operation of my improved phonograph, the record cylinder is slipped over the holder 11, the latter being at one end of the shaft 7. As the said shaft is revolved, the gearing connection 12 and 13 will effect the revolution of the feed screw 14 and this in turn will cause the carriage 16 to be fed along said screw and thereby cause the advancement or traverse of the holder 11 simultaneously with the rotation thereof.

Having thus described the invention, what is claimed as new is:

1. In a phonograph, the combination with a sound box, and its accessories, of a spindle extending across the sound box, a support on which said spindle is mounted to revolve, a cylinder holder slidable longitudinally on said spindle and revoluble therewith, a feed screw extending parallel to the spindle and mounted on said support, means for driving the spindle and feed screw, a guide rod extending parallel to the feed screw and in the rear of the latter, and a feed carriage embodying a clamping nut mounted on said screw and provided with a hinged section, and means for holding said section closed,

spaced ears provided with apertures receiving said guide rod and slidable freely thereon, and a forwardly-extending finger adapted to engage the rear end of the cylinder holder.

2. In a phonograph, the combination with a sound box, and its accessories, of a spindle extending across the sound box, a support on which said spindle is mounted to revolve, a cylinder holder slidable longitudinally on said spindle and revoluble therewith, a feed screw extending parallel to the spindle and mounted on said support, means for driving the spindle and feed screw, a guide rod extending parallel to the feed screw and in the rear of the latter, a carriage mounted on said screw and fed along the same by the revolution of the screw, said carriage being adapted to engage the rear end of the cylinder, a front guide rod mounted on said support, and extending parallel to the first named guide rod, and an arm projecting forwardly from the sound box and provided with a finger resting upon and movable freely along the front guide rod.

3. In a phonograph, the combination of sound reproducing means, including a tapered arm, of a casing adapted to support said means, a megaphone mounted within said casing and provided with an upwardly extending rear end, a pivot spindle extending vertically within the said end, and an extension for said megaphone, said extension being connected at its upper end with said tapered arm and provided at its lower end with a cross bar formed in its lower face with a socket engaged by the upper end of said pivot spindle.

4. In a phonograph, the combination with sound reproducing means, and a tapered arm, of a casing supporting said means, a megaphone mounted within said casing and extending from front to rear and provided with an upwardly extending rear end, an elbow with which the rear end of the tapered arm is pivotally connected, a rearwardly extending bracket projecting from the casing, the elbow extending through said bracket and having a revoluble movement therein in a horizontal plane, the lower end of said elbow extending into the upwardly extending rear end of the megaphone.

In testimony whereof I affix my signature in presence of two witnesses.

HERMANN SCHRÖDER. [L. s.]

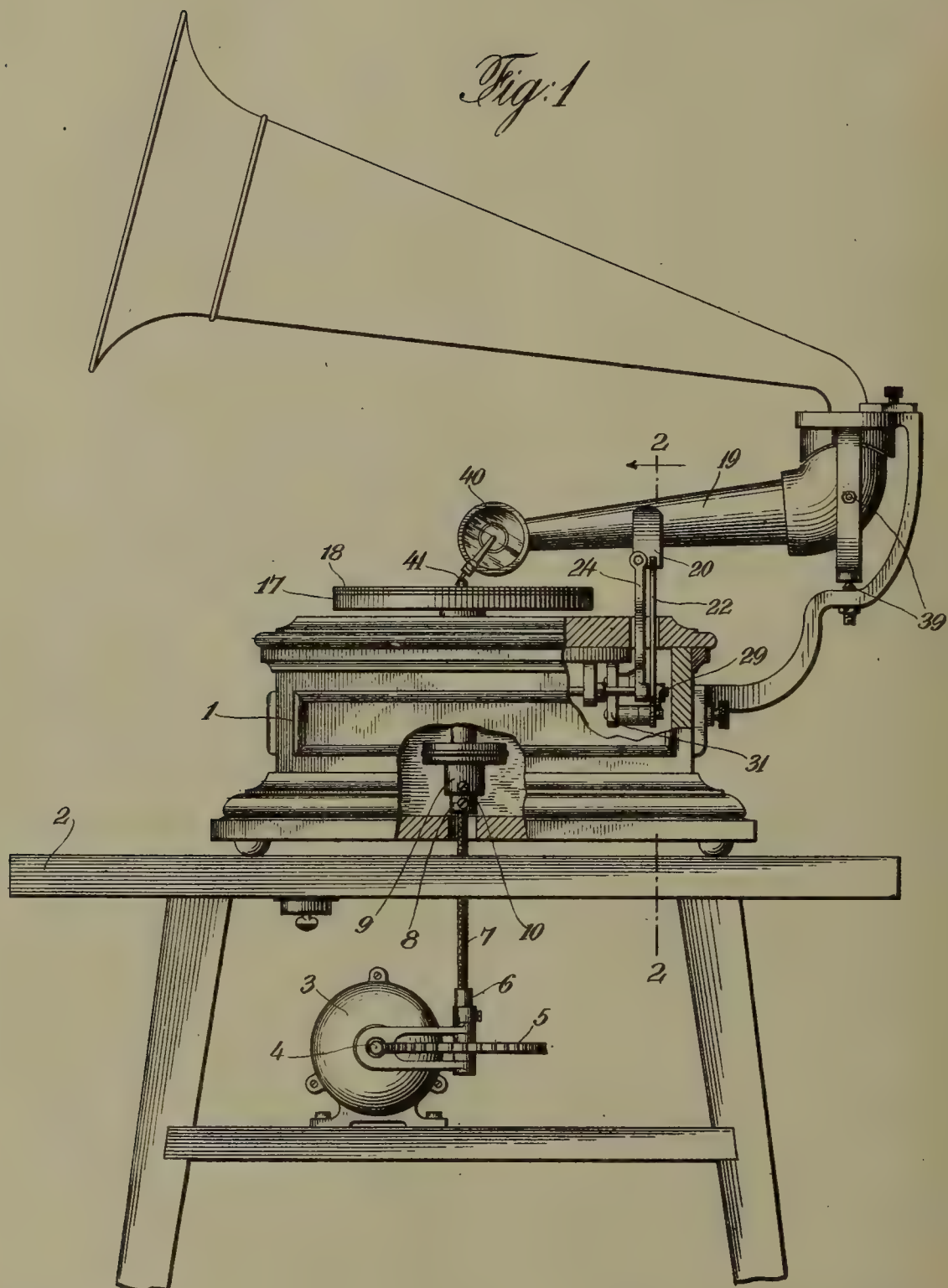
Witnesses:

LAURA HOTTENDORF,
FREDERICK S. STITT.

L. P. VALIQUET.
FEEDING APPARATUS FOR TALKING MACHINES.

APPLICATION FILED APR. 13, 1906.

2 SHEETS—SHEET 1.



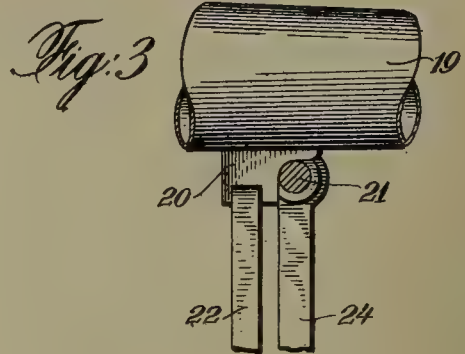
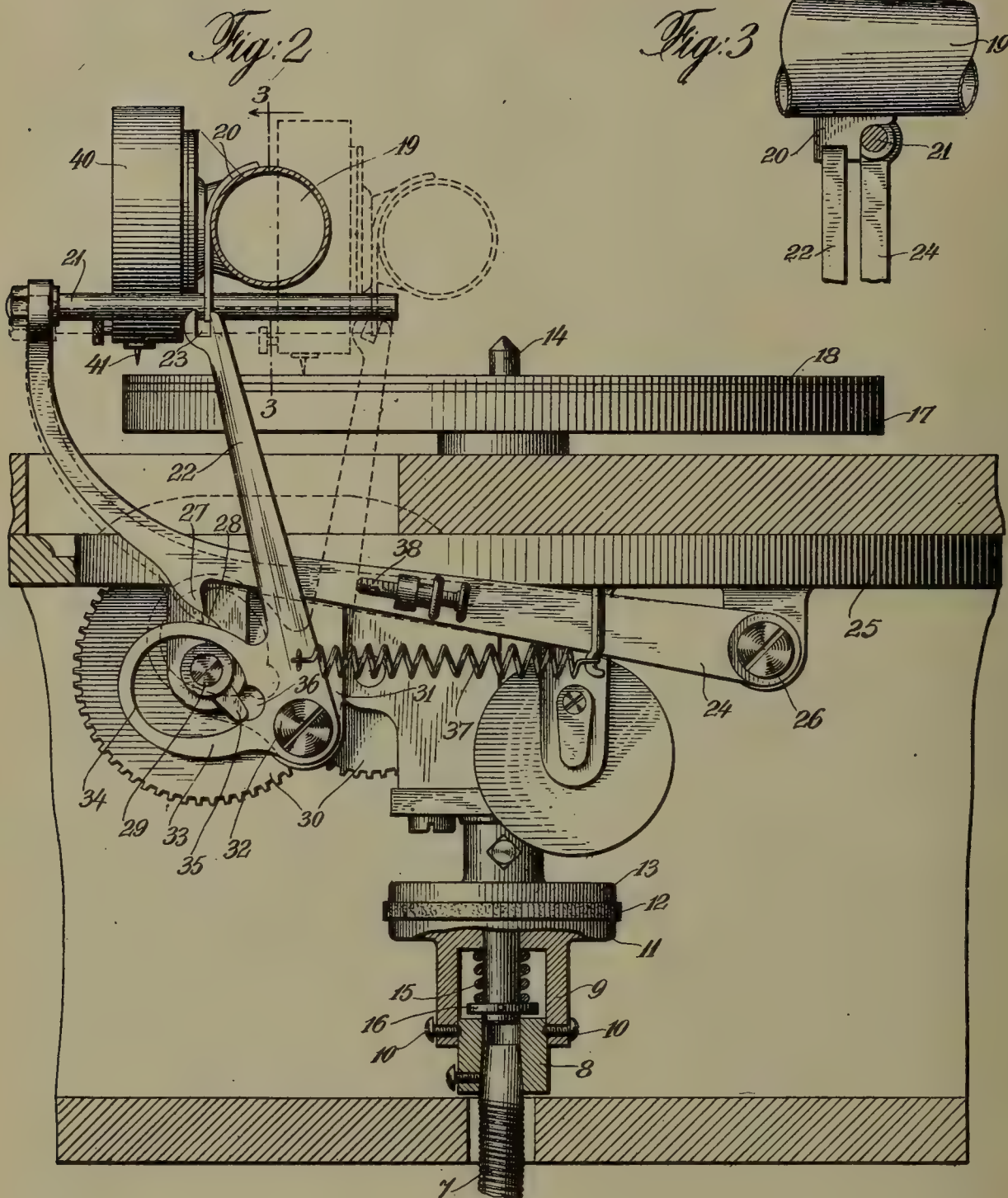
Witnesses
Mark Harmon
M. G. Crawford

Inventor
Louis P. Valiquet
 By his Attorney *A. Parker Smith*

L. P. VALIQUET.
FEEDING APPARATUS FOR TALKING MACHINES.

APPLICATION FILED APR. 13, 1906.

2 SHEETS—SHEET 2.



Witnesses
John C. Connor
W. G. Crawford

Inventor
Louis P. Valiquet
By *his Attorney* *A. B. Perbuth*

UNITED STATES PATENT OFFICE.

LOUIS P. VALIQUET, OF NEWARK, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

FEEDING APPARATUS FOR TALKING-MACHINES.

No. 884,963.

Specification of Letters Patent.

Patented April 14, 1908.

Application filed April 13, 1906. Serial No. 311,597.

To all whom it may concern:

Be it known that I, LOUIS P. VALIQUET, a citizen of the United States of America, and a resident of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Feeding Apparatus for Talking - Machines, of which the following is a specification.

My invention relates to talking machines generally and more specifically consists of an improved positive feeding mechanism for use on machines employing disk records and reproducers mounted upon swinging or universal joints for use in connection with said disk records.

Heretofore it has been customary to permit such disk records to themselves feed the reproducer across the record by the action of the spiral groove in which the sound record is formed, and so dispense with positive feeding mechanism for reasons of simplicity and economy. I find, however, that such use of the sound record as a means for feeding the reproducer is objectionable in some instances, particularly in cases where through wear or accident the intervening walls between two adjacent sections of the spiral become broken down or cut across which causes the reproducing needle to jump back and continue repeating the sounds recorded in one length of said spiral and soon ruin the record by aggravating the defect which first causes this action. At the same time, an unyielding positive feeding mechanism is not practical for machines of this type, as the records shrink and expand under differences of temperature, so that the same record on different days would not correspond to any fixed rate of feed for the reproducer, and also because such disk records are often mounted slightly eccentric to the rotating table so that an unyielding positive feed mechanism would cause the reproducing needle to jump from one section of the groove to another. I have invented a feeding apparatus adapted for use on disk record machines which overcomes all these difficulties and is simple and easy of attachment to standard mechanism now in use. The best form of apparatus embodying my invention at present known to me is illustrated in the accompanying two sheets of drawings in which:

Figure 1 is a side elevation of a talking machine with my invention applied thereto, parts of the casing being broken away to show the internal mechanism. Fig. 2 is an enlarged detail sectional view taken on line 2—2 of Fig. 1. Fig. 3 is a detail showing the manner in which the supporting rod and traversing arm support and grasp the reproducer arm, and Fig. 4 is a detail side view of the cams operating the mechanism.

Throughout the drawings, like reference figures indicate like parts.

1 represents an ordinary talking machine casing resting upon a stand 2, on which is mounted an electric motor 3, which has a worm 4 on its shaft meshing with the worm gear 5 on the vertical shaft 6.

7 is a flexible shaft of any convenient construction communicating motion from short shaft 6 to the coupling 8 inside of the talking machine casing. This coupling 8 is held in the larger coupling 9 by set screws 10, 10. The larger coupling 9 terminates in a flange 11 at its upper portion, which is forced against the disk 12 of felt or other fibrous material grasped between it and the flange 13 on the vertical shaft 14 of the talking machine. This felt washer 12 is spring pressed between the two flanges by means of the spring 15 which surrounds the shaft 14 and is confined between the washer 16 on the lower end thereof and the flange 11.

The table 17 and disk record 18 carried thereby are rotated by the mechanism before described.

To the horn 19, which serves as a reproducer carrying arm, I preferably attach a downwardly extending lug 20 of any convenient form adapted to engage and be engaged by the horizontally extending supporting rod 21 beneath it, and the vibrating traversing arm 22, which has a jaw 23 formed for the purpose in its upper end. The supporting rod 21 is carried in the lever 24, pivoted to the bed plate 25 at 26, and having a sharp cam 27 formed on its under side, which coöperates with the quick action cam 28, mounted on shaft 29, which is driven by any suitable train of gearing 30 from shaft 14. The traversing arm 22 is pivoted to the lug 31 depending from the bed plate 25, said pivot being shown at 32. This traversing arm has a laterally extending lug

33 which is cut out to form the continuous cam race 34, as best shown in Fig. 2. The cam 35 also on shaft 29 coöperates with this cam race 34 and said cam race has a notch 36 into which the cam may be introduced at the proper time for purposes hereinafter to be explained.

37 is a spiral spring connected to the bed plate or projection therefrom at one end and at the other end to the traversing arm 22, and tending to pull the same in a direction to feed the sound box and stylus across the record in a manner to reproduce the sounds recorded thereon.

38 is an adjustable set screw for limiting the motion of the traversing arm, and 39 is any convenient form of swinging or universal joint on which the reproducer 40 is mounted, such reproducer having the stylus or reproducing needle 41 of the usual form.

Such being the construction of my invention, its operation is as follows: The motor being set in operation, its rotation will be transmitted to the table 17 and record 18 carried thereby, any inequalities in its motion being taken up by the friction slip-joint formed by the flanges 11 and 13, and the interposed disk of felt 12. The flexible shaft 7 will compensate for any inaccuracies of adjustment of the talking machine casing 1.

As the driving mechanism operates, it rotates cam shaft 29 with the result that the cam 28, which at rest is in the position shown in full lines in Fig. 2, rotates in the direction of the hands of a watch and soon permits the lever 24 and supporting bar 21 to drop down to the position shown in dotted lines in Fig. 2, thereby bringing the stylus 41 into engagement with the sound record 18.

The same rotation of the shaft causes the cam 35 to slowly traverse the cam race 34, said cam race having such a profile as will permit the traversing arm 22 to be slowly swung to the right by the contraction of the spring 37, and thereby yieldingly feed the stylus forward across the record by exerting yielding pressure thereon, the stylus being restrained against too rapid movement by the record-groove. When the parts have reached the position shown in dotted lines in Fig. 2 and the reproduction is completed, the cam 28 quickly reengages the projection 27 on the under side of the lever 24, quickly raises said lever and the supporting bar 21 so as to disengage the stylus from the sound record and at the same moment the cam 35 entering the notch 36 in the cam race 34 quickly throws the traversing arm 22 to the left into the position shown in full lines so as to retract the reproducer and bring it again over to the starting point. The retraction of the reproducer thus strains spring 37 so that it is restored to potential relation in readiness to again feed the reproducer with yielding pressure across the

record. The motor may be stopped at this point to change the record, or if it continues another reproduction of the same record will result.

The advantages of my invention include the provision of the reproducer resetting apparatus and a feeding device operating by yielding force which while sufficiently powerful to feed the reproducer independent of any feeding action of the record, is still sufficiently flexible to permit the reproducer stylus to adjust itself to any slight inequalities in the record due to expansion or shrinkage or eccentricity. Also, the employment of the flexible driving shaft and friction slip joint, and the economical features of the construction shown. It will be noticed that the feeding action constitutes no drain upon the power of the motor during the reproduction as it is produced by a spring in which the power is stored, as for instance, by the motor during the resetting operation when of course little or no power is required to rotate the sound record and there is available a surplus of power to be thus stored up and given out again during the reproduction of the record. Thus, the addition of my apparatus to the present talking machines will not require the use of any more powerful motor than is now employed in them.

A further and important advantage resulting from the use of the spring for feeding the reproducer across the record is due to the fact that the spring holds the end of the stylus of the reproducer always in contact with one wall of the record-groove, and as a consequence of this the wear on the walls of the record-groove due to the contact of the end of the stylus therewith is considerably reduced.

It is evident of course that various changes could be made in the shape and arrangement of the cam, cam race, &c. and any other details of my invention, without departing from the spirit and scope thereof, so long as the principle of operation above set forth is preserved.

Having, therefore, described my invention, I claim:

1. In a talking machine, the combination with a motor, of a reproducer mounted upon a swinging bearing, a carrier for said reproducer, mechanism positively connecting the motor to the carrier and acting to retract the reproducer, and mechanism operated by a yielding connection independent of the motor for propelling said reproducer across the record.

2. In a talking machine having a motor for rotating the record, the combination of a reproducer mounted on a universal joint, a carrier therefor, positively operated cam mechanism connected to said carrier which retracts said reproducer, and a spring inde-

pendent of the motor for propelling said carrier in a direction to feed said reproducer across the record.

3. In a talking machine, the combination
5 of a reproducer mounted upon a swinging bearing, a carrier therefor, positively operated mechanism connected to said carrier which retracts the reproducer, and mechanism operated by a yielding force connected
10 to said carrier and operating to feed said reproducer across the record, said mechanism comprising a swinging arm having a lug in which a continuous cam race is cut, and a cam carried by a shaft journaled in fixed
15 bearings and engaging said cam race.

4. A feeding and resetting mechanism for talking machines having loosely mounted reproducers comprising in combination a horizontally extending vertically movable supporting bar, means for raising and lowering
20 said bar, a traversing arm adapted to engage the reproducer both when the supporting bar is raised and lowered, and means for reciprocating said arm synchronously with respect
25 to the movements of the supporting bar, said last-named means including a spring independent of the motor of the machine for propelling the reproducer across the record.

5. A feeding and resetting mechanism for
30 talking machines having loosely mounted reproducers comprising in combination a horizontally extending vertically movable supporting bar, means for raising and lowering said bar, a traversing arm adapted to engage
35 the reproducer both when the supporting bar is raised and lowered, and means for reciprocating said arm synchronously with respect to the movements of the supporting bar, said means comprising quick action
40 cams which rapidly retract the traversing arm while the supporting bar is elevated, and a spring independent of the motor of the machine for propelling the reproducer across the record when the supporting bar is lowered.
45

6. A feeding and resetting mechanism for talking machines having loosely mounted reproducers comprising in combination a horizontally extending vertically movable supporting bar, means for raising and lowering
50 said bar, a traversing arm adapted to engage the reproducer both when the supporting bar is raised and lowered, and means for reciprocating said arm synchronously with respect to the movements of the supporting
55 bar, said first mentioned means comprising a quick action raising and lowering cam, and said last mentioned means comprising a quick action retracting and slow feeding cam mounted on the same shaft as the raising and
60 lowering cam.

7. In a disk record talking machine having a motor for rotating the disk, the combination with the reproducer arm of a horizontally
65 extending supporting bar beneath the

reproducer arm, a pivoted lever by which it is carried, a cam below the lever shaped to quickly raise and drop the same, a horizontally traversing arm adapted to engage said
70 reproducer arm, a cam lug on said traversing arm, a cam engaging said lug and adapted to move the arm in a direction to retract the reproducer, and a spring independent of the motor normally tending to move the arm in a direction to feed the reproducer across the
75 record.

8. In a disk record talking machine having a motor for rotating the disk, the combination with the reproducer arm of a horizontally extending supporting bar beneath the
80 reproducer arm, a pivoted lever by which it is carried, a cam below the lever shaped to quickly raise and drop the same, a horizontally traversing arm adapted to engage said reproducer arm, a cam lug on said traversing
85 arm, a cam engaging said lug and adapted to move the arm in a direction to retract the reproducer, and a spring independent of the motor normally tending to move the arm in a direction to feed the reproducer across the
90 record, both said cams being mounted on the same shaft.

9. In a talking machine, the combination of a holder for a disk sound record and means for rotating the same and the record thereon, a support, reproducing mechanism including
95 a stylus carried thereby, and means independent of the sound record and its driving device for yieldingly propelling said reproducing mechanism in a plane substantially
100 parallel with the surface of the sound-record so that the stylus thereof may track in and be restrained by the record-groove throughout the several convolutions thereof.

10. In a talking machine, the combination
105 of a holder for a disk sound record and means for rotating the same and the record thereon, a support, reproducing mechanism including a stylus carried thereby, and means independent of the sound record and its rotating
110 means for yieldingly propelling said reproducing mechanism across the sound record so that the stylus thereof may track in and be restrained by the record-groove throughout the several convolutions thereof, said means
115 being so arranged that restoring said mechanism to its initial position restores said means to potential position.

11. The combination with a talking machine of the type in which the record-groove
120 is spirally formed in a disk adapted to rotate in a horizontal plane and the reproducer is carried by a device pivoted adjacent to said disk, of mechanism for rotating said disk, and means independent of the sound-record
125 and its rotating mechanism for yieldingly propelling said device about its pivotal axis to carry the stylus of the reproducer across the record, said means being so arranged as to be restrained against excessive movement
130

by said record and as to be restored to its potential position in restoring said device to its initial position.

12. The combination with a talking machine of the type in which the record-groove is spirally-formed in a rotatable disk and the reproducer is carried by a pivoted support, of mechanism for rotating said disk, and means independent of the record-groove and the disk rotating mechanism for yieldingly propelling said support about its pivotal axis so that the stylus of the reproducer may track in the record-groove throughout the several convolutions thereof, said stylus being restrained against excessive movement by said record-groove.

13. A sound-reproducing apparatus, comprising a rotating disk whose operative surface lies in a single plane, said disk having a laterally undulating record-groove of substantially uniform depth formed therein, mechanism for maintaining the horizontality of said disk and for rotating the same, a reproducing stylus, and means independent

of the disk-rotating mechanism for yieldingly pressing and propelling the same, while in engagement with said record-groove, in reproducing direction and in a plane substantially parallel with the surface of said disk.

14. In a talking machine, the combination with a motor, of a reproducer mounted upon a swinging bearing, a carrier for said reproducer, mechanism positively connecting the motor to the carrier and acting to retract the reproducer, and mechanism operated by a yielding connection independent of the motor, for propelling said reproducer across the record in a plane substantially parallel with the surface of said record so that the stylus thereof may track in and be restrained by the record groove throughout the several convolutions thereof.

Signed at New York, N. Y. this 10th day of April 1906.

LOUIS P. VALIQUET.

Witnesses:

FRANK O'CONNOR,
M. G. CRAWFORD.

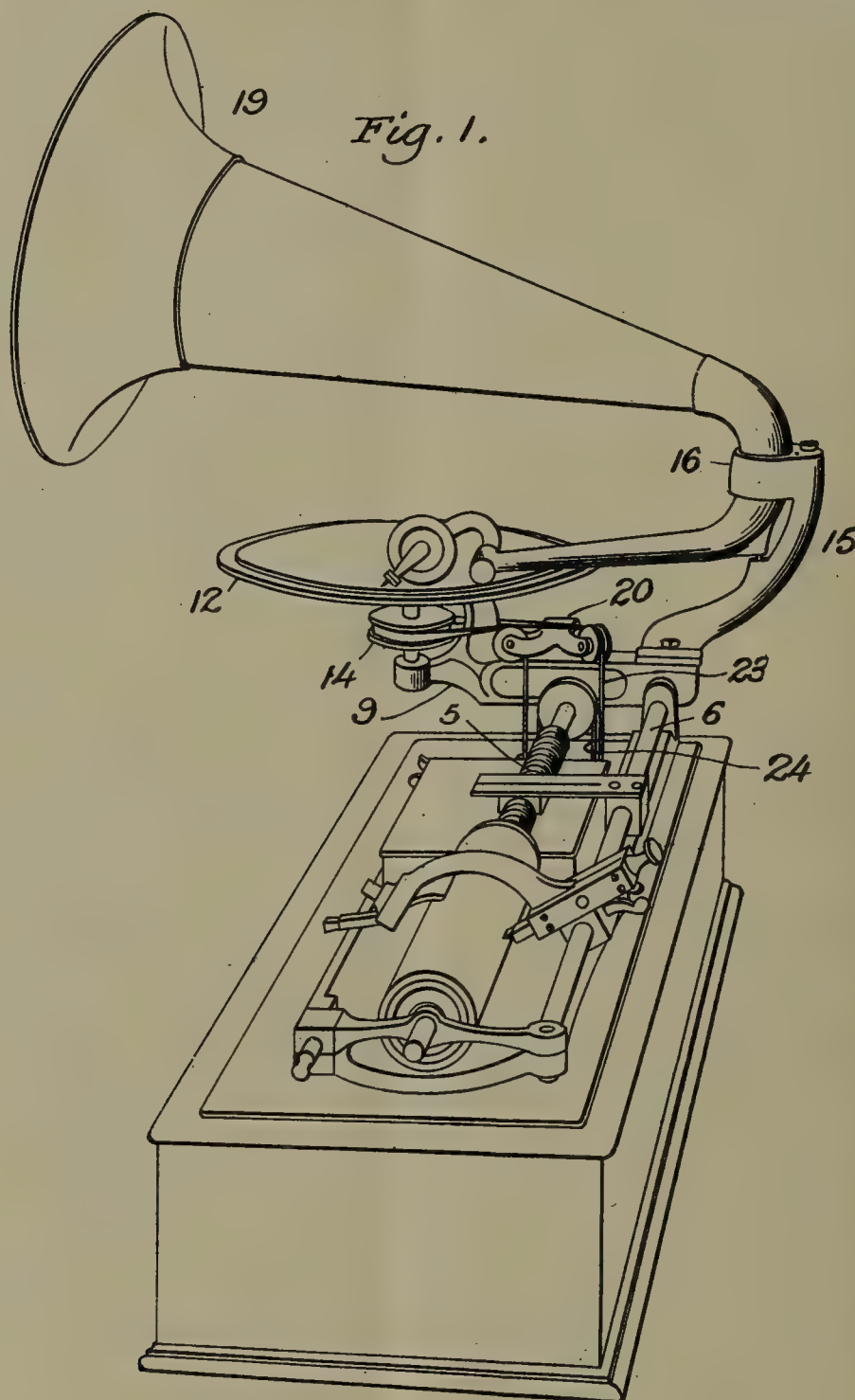
No. 885,178.

PATENTED APR. 21, 1908.

E. PRAZAK.
ATTACHMENT FOR TALKING MACHINES.

APPLICATION FILED MAY 10, 1907.

2 SHEETS—SHEET 1.



WITNESSES
Julius H. Katz
H. G. Dieterich

INVENTOR,
Emil Prazak,
BY
James F. Duhamel
HIS ATTORNEY

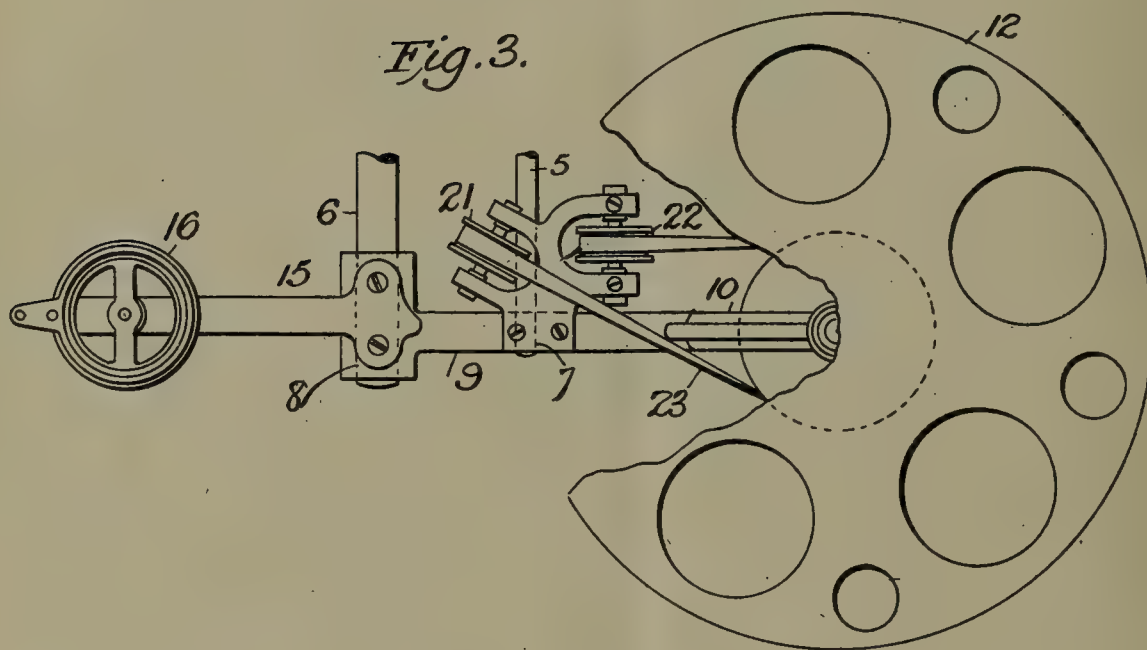
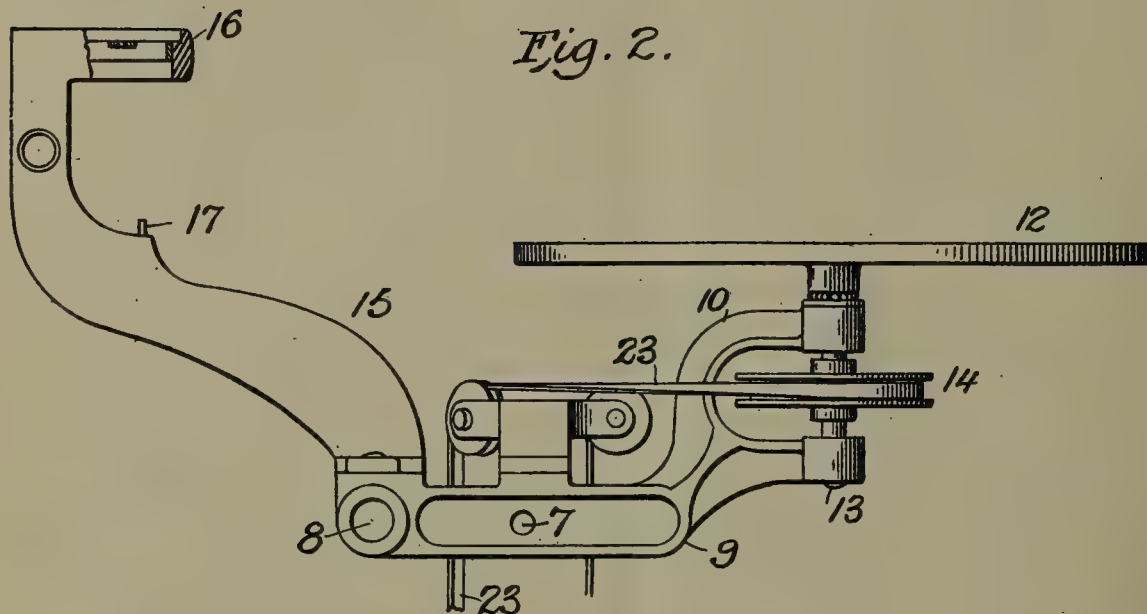
No. 885,178.

PATENTED APR. 21, 1908.

E. PRAZAK.
ATTACHMENT FOR TALKING MACHINES.

APPLICATION FILED MAY 10, 1907.

2 SHEETS—SHEET 2.



WITNESSES
Julius H. Hart
H. G. Dieterich

INVENTOR
Emil Prazak,
BY
James P. Duhamel
HIS ATTORNEY

UNITED STATES PATENT OFFICE.

EMIL PRAZAK, OF ELIZABETH, NEW JERSEY.

ATTACHMENT FOR TALKING-MACHINES.

No. 885,178.

Specification of Letters Patent.

Patented April 21, 1908.

Application filed May 10, 1907. Serial No. 372,865.

To all whom it may concern:

Be it known that I, EMIL PRAZAK, a citizen of the United States, and resident of Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Attachments for Talking-Machines, of which the following is a specification.

This invention relates to talking machines and more particularly to means by which the two common types of these machines, namely; the machine employing a cylindrical record and that using the disk record, may be combined with little cost, simplicity of arrangement and almost instantly and a common motor used to rotate either record.

The device comprises a frame with a rotating platform mounted on roller bearings and having pulleys carrying a belt or gearing driven by the motor of a cylinder record machine as will be more fully described in the following specification, set forth in the claims and shown in the drawings where it will be seen that like reference characters are used to designate the same parts in the several figures.

Figure 1 is a perspective view of a phonograph. Fig. 2 is a side elevation of the device detached. Fig. 3 is a plan view of same.

The device is adapted to be carried by the center of the arbor 5 and the guide rod 6 of the ordinary phonograph and extensions of these two parts enter the holes 7 and 8 respectively of the frame 9 fitting easily thereon when it is desired to convert the machine into a disk operating talking machine or to combine the operation of the two records and cause them to work simultaneously.

The frame 9 as will be seen in Figs. 2 and 3 has at one end a bracket 10 supporting on ball bearings 11 the circular platform 12 while the latter's shaft 13 is journaled in the forked arms of the bracket and carries a pulley 14 by which the platform is rotated. The other end of the frame carries an arm 15 with a socket 16 and pivot 17 for the horn 19.

The frame 9 has secured to it a bracket 20 in which are journaled the pulleys 21 and 22 and which direct the band 23 from the motor within the box of the phonograph to the pulley 14. The motor being of the usual construction it has not been thought necessary to show same, but it is obvious that a train of gearing might be substituted, the band is, however, light and noiseless and readily put

in place when the attachment is secured to the phonograph.

When it is desired to apply my improved device to the phonograph it is simply slipped over the extensions of the arbor center and guide rod and after the belt is adjusted the instrument is ready for operation. In case the motor is provided with two driving pulleys the band 24 for the phonograph need not be disturbed but whichever instrument it is desired to put out of operation its band is disconnected.

It is obvious that I do not limit myself to the exact construction shown nor to the exact arrangement of parts and if found advisable or desirable various modifications may be resorted to without departing from the essential features shown and described.

What I claim as new and desire to secure by Letters Patent is:

1. In an attachment for talking machines, the combination with the arbor center and guide rod of a phonograph, of a frame with perforations adapted to fit the ends of the said arbor and guide rod, a rotating disk, a pulley on the shaft of the disk and means connected with the motor of the phonograph for driving the pulley.

2. In an attachment for talking machines, the combination with a phonograph, of an arbor center, a guide rod, extensions on the arbor and guide rod, a frame adapted to be secured to said extension and braced against the adjacent side of the phonograph, a rotating plate adapted to carry disk records, a reproducer and an amplifying horn carried by the frame, and means for conveying motion from the motor of the phonograph to the rotating plate.

3. In an attachment for talking machines, the combination with a phonograph having an arbor and a guide rod, of extensions to the arbor and the guide rod, a frame adapted to be carried by the extensions, a rotating plate for the record, a reproducer, an amplifying horn, a pulley on the shaft of the plate, a belt connecting the pulley of the motor of the phonograph, and idlers for directing the passage of the belt.

4. In an attachment for talking machines, the combination with a phonograph having an arbor and guide rod, of a frame adapted to be carried by the arbor and guide rod, a rotating plate for a disk record, a ball bear-

ing support on the frame for the plate, a re-
producer, an amplifying horn pivoted in the
frame, rotating means on the shaft of the
plate, and means connecting the rotating
5 means with the motor of the phonograph so
that the record of the same may be operated
simultaneously with the disk record.

Signed at city of Elizabeth in the county
of Union and State of New Jersey this 1st
day of May A. D. 1907.

EMIL PRAZAK.

Witnesses:

RALPH R. THOMAS,
EMIL TAUSSIG.

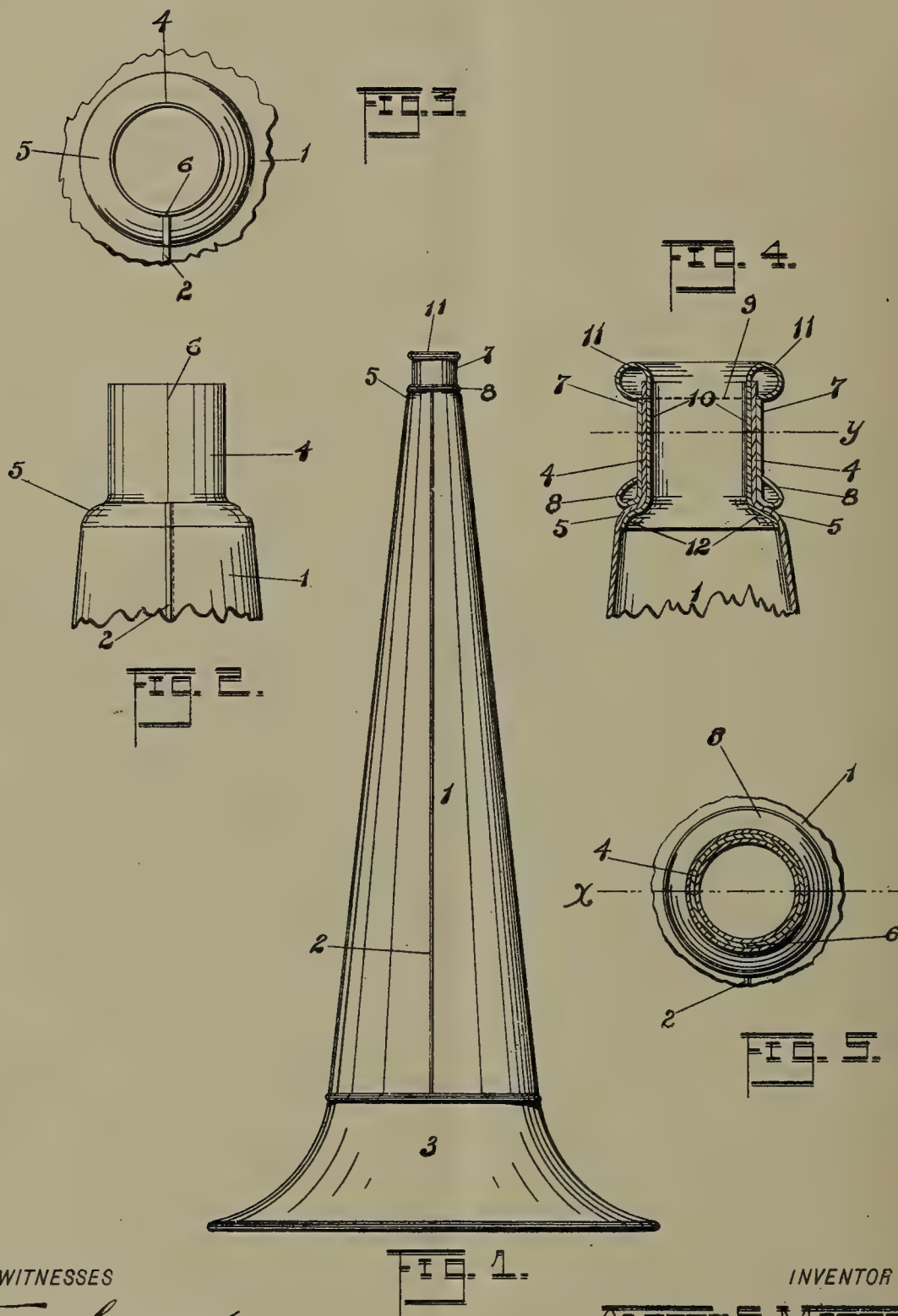
No. 885,268.

PATENTED APR. 21, 1908.

A. S. MARTEN.

HORN.

APPLICATION FILED NOV. 17, 1906.



WITNESSES

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Ethel B. Reed

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ALBERT S. MARTEN.

BY

Russell M. Everett

ATTORNEY.

UNITED STATES PATENT OFFICE.

ALBERT S. MARTEN, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO THE TEA TRAY COMPANY OF NEWARK, N. J., A CORPORATION OF NEW JERSEY.

HORN.

No. 885,268.

Specification of Letters Patent.

Patented April 21, 1908.

Application filed November 17, 1906. Serial No. 343,786.

To all whom it may concern:

Be it known that I, ALBERT S. MARTEN, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Horns, of which the following is a specification.

The objects of this invention are to secure in a sound amplifying horn, a ferrule which shall be strong and stiff and at the same time of finished appearance; to secure a smooth circumferential surface on both the inside and the outside of the ferrule without any longitudinal seams; to avoid soldering and secure joints which are only pressed or reamed together, and to obtain other advantages and results as may be brought out in the following description.

Referring to the accompanying drawings, in which like numerals of reference indicate corresponding parts in each of the several figures, Figure 1 is a side elevation of a horn of my improved construction; Fig. 2 is a similar view of the small end of the body portion of the horn showing its integral ferrule part with the inside and outside sleeves removed; and Fig. 3 is a plan of the same; Fig. 4 is a central longitudinal section of the small end of the horn taken as on line *x*, Fig. 5, and Fig. 5 is a transverse section through the ferrule of the horn as on line *y*, Fig. 4.

In said drawings, 1 indicates the body of the horn made tapering in any usual manner and having a longitudinal seam 2 formed by overlapping and interlocking the edges of the metal. This seam as is usual in horns, projects inwardly in order to provide a smooth exterior, and at the large end of the body 1, is a bell 3 of any ordinary type. At its small end, the said body 1 of the horn has an integral cylindrical ferrule portion 4 swaged down from the body part, and thus when completed, connected to said body by a shoulder 5, as shown in Figs. 2 and 3 more particularly. The longitudinal seam 2 of the horn body stops short of the said cylindrical ferrule part 4, and for said ferrule part the edges of the metal simply abut, as shown at 6 in said Figs. 2 and 3. This result is secured by notching the end of the horn body or cutting away the margins of the metal sections as will be understood by those

skilled in the art. The longitudinal seam 1 projecting at the interior of the horn therefore stops at the shoulder 5, and the ferrule portion 4 is smoothly cylindrical on both inside and outside. An outer sleeve or lining 7, preferably made of seamless tubing, and fitting nicely, is then slipped over the said ferrule portion 4, the end edges of said sleeve being adjacent to the shoulder 5, rolled or curled outwardly and backwardly as at 8. The opposite end of the said outer lining 7 preferably terminates somewhat short of the end of the ferrule portion 4. An inside lining or sleeve 10, also preferably of seamless tubing, is then fitted tightly within the ferrule portion 4 of the horn body, and its outer end edges curled or rolled outwardly forward, as at 11, to abut edgewise against the outside of the ferrule portion 4 and engage at their forward sides the outer end 9 of the sleeve 7. The inner end 12 of the inner sleeve 10 is then reamed or pressed outwardly to overreach the shoulder 5 on the inside of the horn and thus prevent the said inner sleeve or lining from escaping outward.

It will be understood that by the above construction, the integral ferrule portion 4 and its inside and outside linings are firmly bound together, so that a solid strong ferrule is provided for the horn. There are no exposed unfinished edges, and both the outside and inside of the ferrule is smoothly cylindrical with no seam. The ferrule is greatly reinforced or strengthened so that it is better able to support the weight of the horn, and furthermore the ferrule may be made to appear of different metal or finish from the body of the horn, and thus enhance its appearance.

The roll 8 of the outer sleeve strengthens and stiffens the horn at the junction of its ferrule and body portion, just where strengthening is especially needed, as for instance when the horn is supported solely by being slipped at its ferrule telescopically upon the neck of a speaker or sound-box. Furthermore, it would be impossible to end a straight cut-off sleeve on the curved shoulder joining the horn body and its ferrule portion, without there being a very obtrusive, unsightly and even dangerous sharp edge. By means of the roll 8, however, the end edge of the outer sleeve is turned in or butted against the

cylindrical part of the sleeve, and a neat, smooth finish secured which cannot scratch or be unpleasant to the touch.

Having thus described my invention, what I claim as new is:

1. In a horn, the combination of a flaring body having a reduced integral ferrule portion forming with said body an annular shoulder and having a longitudinal joint, an exterior annular enlargement at the extremity of the ferrule, and a seamless sleeve upon the outside of said ferrule portion between said shoulder and annular enlargement.

2. In a horn, the combination of a flaring body having a reduced integral ferrule portion forming with said body an annular shoulder and having a longitudinal joint, an exterior annular enlargement at the extremity of the ferrule, and a seamless sleeve upon the outside of said ferrule portion between said shoulder and annular enlargement having its end next said shoulder fitted thereagainst with the edges rolled outwardly and returned against itself.

3. In a horn, the combination of a flaring body having a reduced integral ferrule portion forming with said body an annular shoulder and having a longitudinal joint, an outward roll at the extremity of said ferrule portion returned against the said ferrule, and a sleeve upon the outside of said ferrule portion between said shoulder and roll having its end edges next the said roll abutting thereagainst.

4. In a horn, the combination of a flaring body having a reduced integral ferrule portion forming with said body an annular shoulder and having a longitudinal joint, a tubular lining inside said ferrule portion having one end curled outwardly over the end edges of the ferrule portion and its other end expanded into the flaring part of the horn, and an outer sleeve upon the said ferrule portion between the said shoulder and curled end of the said lining.

5. In a horn, the combination of a flaring body having a reduced integral ferrule portion forming with said body an annular shoulder and having a longitudinal joint, a tubular lining inside said ferrule portion having one end rolled up over the end edges of the ferrule portion and its other end expanded into the flaring part of the horn, and an outer sleeve upon the said ferrule portion between the said shoulder and said outward roll of the lining having its end next said shoulder fitted thereagainst with the edges rolled outwardly and returned upon itself.

6. In a horn, the combination of a flaring body having a reduced integral ferrule portion forming with said body an annular

shoulder and having a longitudinal joint, a tubular lining inside said ferrule portion having one end curled outwardly over the end edges of the ferrule portion and returned to abut at its edges against the outer surface of said ferrule portion, the other end of said lining being expanded into the flaring part of the horn, and a sleeve upon the outside of said ferrule portion having its edges at one end abutting against the said outward curl of the lining and its other end portion fitted against the said shoulder with the edges rolled outward and returned against itself.

7. In a horn, the combination of a flaring body having a reduced integral ferrule portion forming with said body an annular shoulder and being longitudinally slit from said shoulder to its extremity, an inner tubular lining fitting said ferrule portion and having one end curled outwardly over the extremity of the ferrule portion and its other end expanded into the flaring part of the horn, and a sleeve upon the outside of the ferrule portion between said curl and said shoulder.

8. In a horn, the combination of a flaring body having a reduced integral ferrule portion forming with said body an annular shoulder and being longitudinally slit from said shoulder to its extremity, an inner tubular lining fitting said ferrule portion and having one end curled outwardly over the extremity of the ferrule portion and its other end expanded into the flaring part of the horn, and a sleeve upon the outside of the ferrule portion between said curl and said shoulder having its end next said shoulder fitted thereagainst with the edges rolled outwardly and returned against itself.

9. In a horn, the combination of a flaring body having a reduced integral ferrule portion forming with said body an annular shoulder and being longitudinally slit from said shoulder to its extremity, an inner tubular lining fitting said ferrule portion and having one end curled outwardly over the extremity of the ferrule portion and returned to abut edgewise against the outer surface of said ferrule portion and its other end expanded into the flaring part of the horn, and a sleeve upon the outside of said ferrule portion having its edges at one end abutting against the said returned portion of the inner lining and its other end portion fitted against the said shoulder with its end edges rolled outwardly and returned against itself.

ALBERT S. MARTEN.

In the presence of—

ETHEL B. REED,

FREDERICK GERMANN, Jr.



B. F. KEATING.
TALKING MACHINE ATTACHMENT.
APPLICATION FILED NOV. 22, 1907.

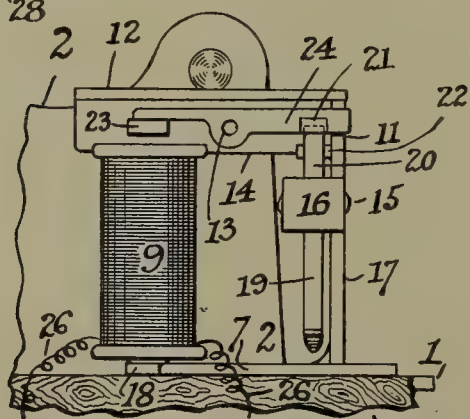
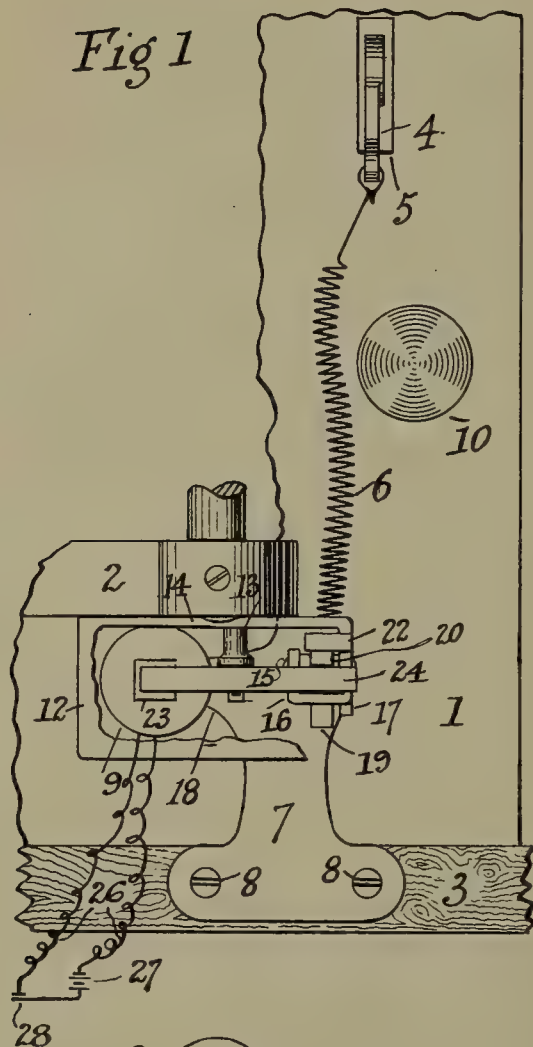


Fig 2

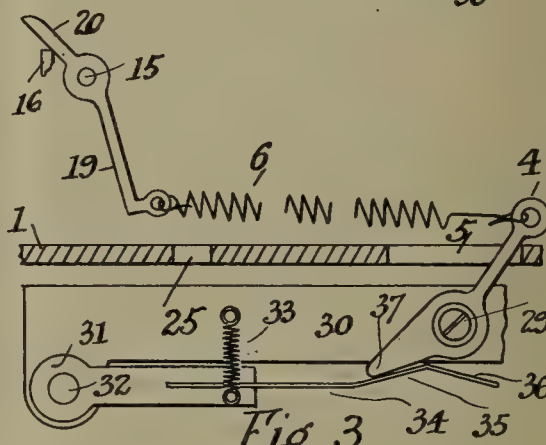
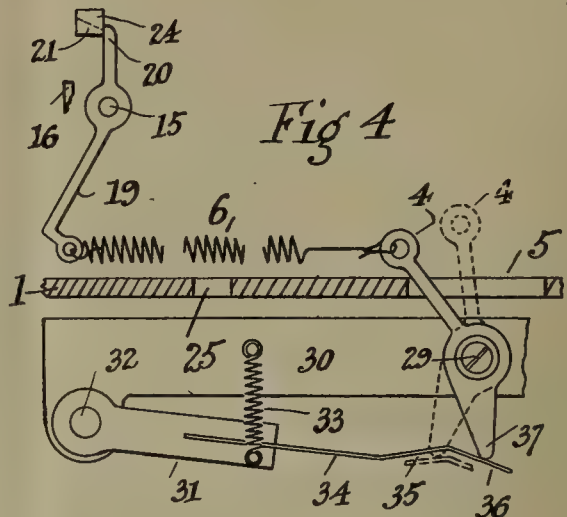


Fig 3

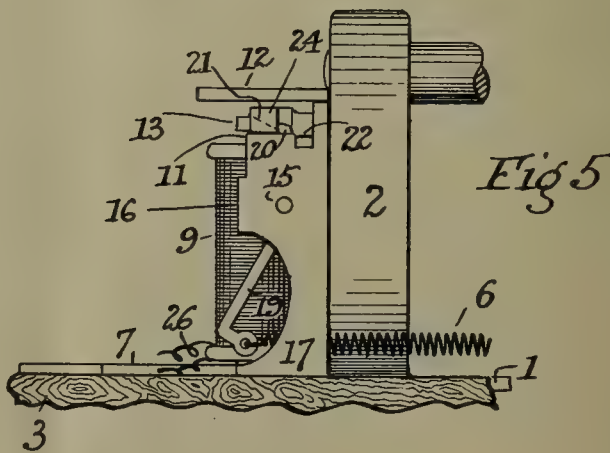


Fig 5

Witness:-
F. R. Pitton
J. H. H. H.

Inventor:-
Bernard Francis Keating
By William, J. H. & W. H. H.

his Attorney.

UNITED STATES PATENT OFFICE.

BERNARD FRANCIS KEATING, OF HAWTHORN, VICTORIA, AUSTRALIA.

TALKING-MACHINE ATTACHMENT.

No. 885,484.

Specification of Letters Patent.

Patented April 21, 1908.

Application filed November 22, 1907. Serial No. 403,372.

To all whom it may concern:

Be it known that I, BERNARD FRANCIS KEATING, a subject of the King of Great Britain and Ireland, &c., residing at Hawthorn, in the State of Victoria, Commonwealth of Australia, have invented certain new and useful Improvements in Talking-Machine Attachments; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The ordinary sound reproducing or talking machine has a motor which is started or stopped by moving by a hand lever—which puts a governor brake “on” to bring the motor to rest—and takes it “off” when the motor is to be set running. This invention is applicable to such a lever without interfering with its positioning by hand as heretofore. In order that at a future time, or in a certain event, the machine shall reproduce sound from a “record” mounted on it this invention provides for the hand lever being located at will intermediately between the ordinary “on” and “off” extreme positions.

The above will be understood from the accompanying drawings in which

Figure 1 is a plan view showing part of a phonograph or graphophone with my attachment. Fig. 2 is a side elevation of Fig. 1. Fig. 3 is a front view partly in vertical section illustrating the position of some of the parts when the motor is running. Fig. 4 shows the parts in Fig. 3 when the hand lever is in its intermediate position—that is when the motor is not running. Fig. 5 shows, in front elevation, the parts in Fig. 2.

In these drawings 1 shows the top plate of the phonograph or like machine, 2 a lug thereon, 3 boxing or framing, 4 the hand lever, shown projecting up through slot 5 in plate 1 these parts not being new. To lever 4 a spiral spring 6 is connected.

7 is the base plate of my attachment, which has any suitable means for fixing it, such as screws 8 entering framing or box 3. Part of this base plate is an arm or lug 18 which supports an electro magnet or coil 9, the armature of which, 23, is normally raised as in Fig. 2. The material of base plate 7 is bent up to form pillar 17, integral with which is a lug 16 bent to extend parallel to the pillar, or so as to enable an axle or spindle, 15, to be supported or journaled in the parts 16,

17. This spindle carries a lever having arm 19 connected to spring 6, and an arm 20 which is temporarily held up by a lever 24 as hereinafter described—see Figs. 4 and 5. From pillar 17 the material extends to form a back plate 14, on which is mounted a pin 13 on which the armature lever 24 is pivoted. This lever at one end carries armature 23, and has an inclined or beveled surface 21 at or near its other end which normally is depressed, resting on a stop 11, which is part of plate 17, see Figs. 2 and 5. Part 12 situated over lever 24 and electro magnet 9, is a protective plate integral with the back 14.

21 on lever 24 is a beveled or inclined surface such that arm 20 on pressing said surface causes that end of the lever to rise, so that arm 20 passes the lever, upon which the latter will drop preventing the arm returning till lever 24 moves.

Part 22 integral with pillar 17 is a stop behind arm 20 so that the latter will be close behind lever 24 so that if the latter lifts momentarily a small movement of arm 20 will insure its descent. Furthermore this descent is insured by the gravity of arm 19 or by the pull of spring 6.

The position of connected parts 4, 6, 19, 20, of Figs. 1, 2, and 5 is seen clearly in firm lines in Fig. 4; but in Fig. 3 these parts are shown in a different position arrived at partly by the preliminary setting of lever 4 as dotted in Fig. 4, and subsequently by the movement of the lever 24 by the closing of a contact 28 in an electrical circuit comprising wires 26, battery 27, and electro magnet 9; the result being to draw down armature 23 see Fig. 2. The battery is in some instances located in the phonograph or machine casing; in others it is at a distance—part of an electric bell circuit for example. When arm 20 falls it is arrested by a stop, shown in Fig. 3 as formed by part 16.

An aperture 25 in plate 1 Figs. 3 and 4 receives a regulating screw 10 Fig. 1, these parts not being otherwise shown, and not incidental to this invention. The said screw is in use as a regulator of an arm 31 which is pivoted at 32 to framing 30. Lever 4, pivoted at 29 to frame 30, has an inner end 37, against which bears end 36 of a bent spring 34 which projects from arm 31 and has an intermediate upwardly inclined part 35. The upward tendency of spring 34 is insured by a spring 33 connecting frame 30 to arm 31.

When lever 4 is located as in firm lines in Fig. 4 the spring 6 is left slack, no pull being then needed on lever 19, and consequently no pressure of arm 20 on the back of lever 24.

5 Any movement of armature lever 24 would then have no effect on lever 4, so that the phonograph motor would not thereby be affected. Lever 4 could evidently be moved by hand at any time at will to start or stop
10 the motor. By setting lever 4 however as in dotted lines Fig. 4 spring 6 is slightly stretched, causing or insuring slight pressure of arm 20 on the back of lever 24, and end 37 is brought over part 35 of spring 34, which is
15 however unable to as it ordinarily would do further swing lever 4 by its pressure, owing to the resistance of spring 6, and of lever 24 to the movement of arm 20. But when lever 24 moves, the various parts will take
20 the positions in Fig. 3. This will be so because the pressure of part 35 of spring 34 on part 37 of lever 4 then swings that lever on its pivot, spring 6 and lever arms 19 and 20 being then free.

25 The various parts illustrated below plate 1 in Figs. 4 and 3 are already used in graphophones; in which to cause the motor to run it is only necessary to move lever 4 to allow spring 33 to lift arm 31 into the position of
30 Fig. 3. There is however no provision in graphophones for setting lever 4 as in dotted lines in Fig. 4 and releasing the said lever by attached electrical mechanism as herein described, whereby to allow spring 33 to cause
35 spring 34 to swing lever 4 to the position in Fig. 3.

In the following claims I term for brevity part 4 a motor controlling hand lever, or simply a hand lever, parts 19 and 20 an intermediate lever as it is between levers 24 and
40 4, and spring 6 an intermediate spring as it is between lever 4 and part 19.

Although the illustrations show the form in which the mechanism is preferably constructed, there may obviously be sundry
45 variations made, within the scope of my claims. For example bevel 21 is not essential.

What I do claim as my invention and
50 desire to secure by Letters Patent of the United States is:—

1. In a talking machine, a hand lever for controlling said machine; an attachment having an electro magnet and an armature
55 lever; means for making an electric circuit

through the coil of said magnet to operate the latter lever from a distance; an intermediate lever and spring connection to said hand lever; and a stop whereby the intermediate lever is held by the armature lever
60 so that the hand lever is retainable in an intermediate position as set forth, and will allow the motor to move when the armature lever is moved as described.

2. In a talking machine an attachment
65 comprising a hand lever for controlling said machine; a spring 6, connected to said lever; an intermediate lever 19, 20, controlled by said spring; an armature lever 24, and a stop 16, also, controlling said lever 19, 20, and a
70 magnet controlling said armature lever, substantially as described.

3. In a talking machine, an attachment having an electro magnet for energizing it by making a contact at a distance from the machine; a pivoted armature lever for said magnet; an intermediate lever adapted to move and pass the armature lever and have its return stopped by the latter; a motor controlling hand lever; and a spring connection
80 from the intermediate lever to said motor controlling hand lever, substantially as described.

4. In a talking machine attachment a base plate 7, provided with a lug 18; a pillar
85 17; a lug 16 and stops 11 and 22; integral with said pillar; a back plate 14; and a protective plate 12, integral with said back plate, substantially as described.

5. In a talking machine an attachment
90 comprising a suitable base plate; an electro magnet; an armature lever for the same; an electrical circuit to operate the said lever from a distance; a pivoted lever 19, 20; a spring 6; a hand lever 4; and a member having
95 surfaces 35, 36, adapted to control said hand lever, substantially as described.

6. In a talking machine; a hand lever capable of occupying two extreme positions for controlling the same; means for holding
100 said hand lever in a mid position; and means controllable from a distance for causing said hand lever to move from its mid to one of its extreme positions, substantially as described.

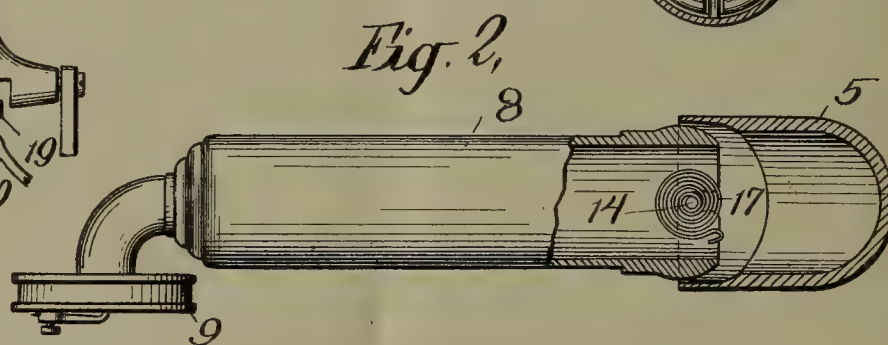
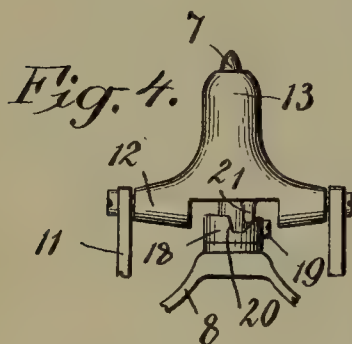
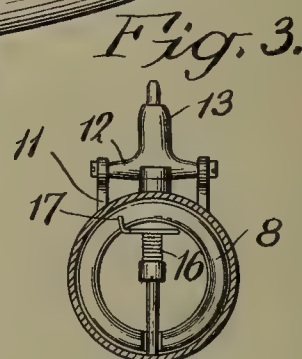
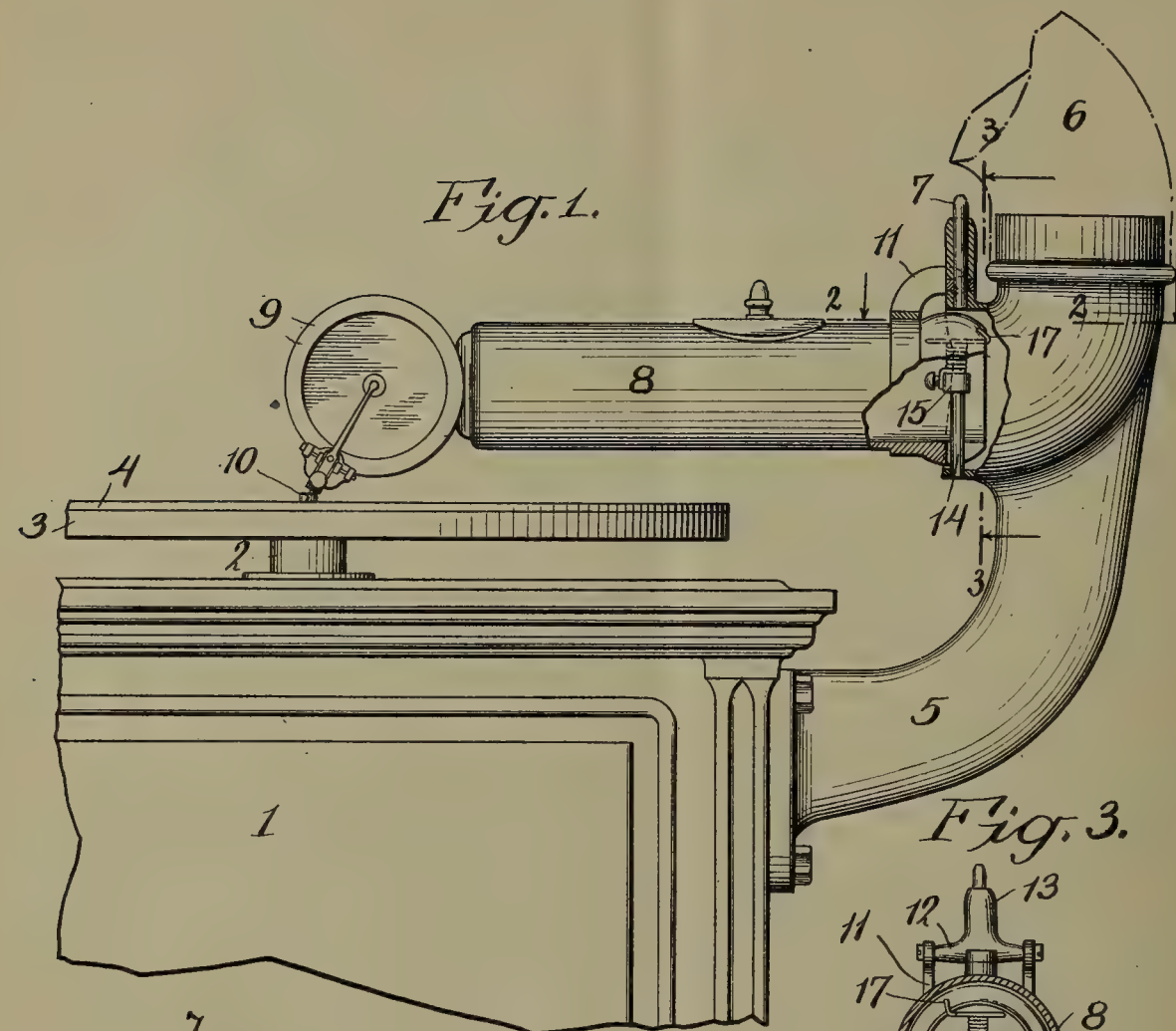
In testimony whereof, I affix my signature
105 in presence of two witnesses.

BERNARD FRANCIS KEATING.

Witnesses:

GEORGE G. TURRI,
BEATRICE M. LOWE.

T. KRAEMER.
TALKING MACHINE.
APPLICATION FILED NOV. 5, 1907.



WITNESSES:

W. Edwards.
J. Bartlett



INVENTOR

Thomas Kraemer

BY

J. C. Edwards

ATTORNEYS

UNITED STATES PATENT OFFICE.

THOMAS KRAEMER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

TALKING-MACHINE.

No. 885,489.

Specification of Letters Patent.

Patented April 21, 1908.

Application filed November 5, 1907. Serial No. 400,735.

To all whom it may concern:

Be it known that I, THOMAS KRAEMER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Talking-Machines, of which the following is a specification.

This invention relates to talking-machines of the type employing a pivotally mounted sound-tube having a sound-box connected to one end thereof with its stylus tracking in the record-groove.

More particularly, the invention relates to such machines of the type employing devices for exerting a yielding pressure upon the sound-tube tending to turn it about its pivot to feed the sound-box across the record, the sound-tube and -box being restrained against too rapid movement by the coaction of the stylus with the wall of the record-groove.

The object of the invention is to effect certain improvements in the construction of the devices for exerting this yielding pressure.

In accordance with the invention, these devices are mounted within the sound-conveying tube so that they are concealed from view, and therefore do not detract from the appearance of the machine. Furthermore, these devices are so arranged that in mounting the sound-conveying tube upon its support, the yielding-pressure devices are brought to potential relation, so that they are in readiness for operation, without any manipulation on the part of the operator.

The preferred embodiment of my invention is illustrated in the drawings, in which Figure 1 is a sectional elevation of a portion of a talking-machine; Figs. 2 and 3 are detail views in section on lines 2—2 and 3—3, respectively, of Fig. 1, and Figs. 4 and 5 are detail views in elevation and perspective, respectively, hereinafter referred to.

Referring to these drawings, 1 indicates the motor-box of the talking-machine, within which is a motor driving a vertical shaft 2. This shaft has a turn-table 3 secured upon its upper end, on which the disk-record 4 is adapted to lie. A coupling-member 5 is secured to one side of the motor-box and ex-

tends outwardly and upwardly therefrom. Through the upper end of this member is an opening, and the wall about the upper end of this opening is formed to provide a support for an amplifying-horn 6, the small end of which communicates with this opening. Mounted upon the member 5, near the end of the opening opposite to that with which horn 6 communicates, is a pin 7 vertically disposed. The tone-arm 8 is pivotally mounted at one end upon the member 5, and at its other end carries the sound-box 9, the stylus 10 of which tracks in the record-groove. The tone-arm 8 has brackets 11 secured thereto, in which a cross-head 12 is mounted on horizontal pivots, as best shown in Fig. 3. This cross-head carries a vertically disposed sleeve 13. The tone-arm is mounted upon the coupling-member by passing the sleeve 13 down over the pin 7, the tone-arm 8 during this operation being held at somewhat of an angle to the horizontal, and the tone-arm is then lowered to its horizontal position, this movement carrying its end a short distance into the opening in the coupling-member 5. This being done, the tone-arm is capable of movement in any direction, so that the stylus of the sound-box may track faithfully in the record-groove, the arm turning about the pin 7 as a vertical axis and about the pivots of the cross-head 12 as a horizontal axis.

A post 14 is mounted upon the coupling-member 5 a short distance within the end of the opening therethrough which the tone-arm 8 enters. A short slot may be cut in the end of the tone-arm 8, through which this post may extend, as shown in Fig. 1. Secured on the post is a collar 15, to which is secured one end of a coil-spring 16. The other end of this spring is carried out a short distance from the axis of post 14 and is provided with a hooked end portion, as shown at 17. In the drawings, the spring 16 is shown as of helical form through a portion of its length, and then of constantly increasing diameter; but variations in this respect may of course be made. The hooked end 17 of spring 16 engages the end of the tone-arm 8, as best shown in Fig. 1, so that the spring tends to turn the tone-arm about the pin 7 as an axis with a yielding pressure, this pres-

sure serving to feed the sound-box across the record as the sound-record 4 is rotated.

When the tone-arm 8 is turned about the axis of the pivots of cross-head 12, raising the sound-box 9 off the record, the inner end of the tone-arm 8 will be carried to the left in Fig. 1 until it releases the hooked end of spring 16. When tone-arm 8 has been turned to this extent, its inner end is free of the walls of the opening through coupling-member 5, and the tone-arm may be raised to carry sleeve 13 off of pin 7. It will be seen that in mounting tone-arm 8 upon coupling-member 5, performing the movements above described in reverse order, the inner end of tone-arm 8 will engage the hooked end of spring 16 without any manipulation on the part of the operator directed particularly to causing such engagement, and will put spring 16 under tension, so that when the tone-arm and sound-box are in position for operation, the spring 16 will be in potential relation. Furthermore, it will be seen that the spring for exerting the yielding pressure and the post supporting the same are within the sound-conveying device, including the tone-arm and the opening through the support therefor, so that these parts are concealed from view.

With disk sound-records as commonly constructed, the record extends from the periphery of the disk inwardly a distance from the periphery, and at the center of the disk are a circular space to receive a label and an opening through which the upper end of the shaft 2 extends. The spring 16 or other yielding-pressure device acts on the tone-arm to turn it about its pivot in order to carry the stylus of the reproducer across the portion of the disk having the sound-record formed therein, and at the conclusion of the reproduction this yielding-pressure device would, if means were not provided to guard against it, carry the stylus across the label portion of the disk and into engagement with the shaft 2, resulting in damaging the stylus and possibly the reproducer. To prevent this, I provide a stop device arranged to arrest the movement of the tone-arm and sound-box about the pivot of the tone-arm at the conclusion of the reproduction, this means being adjustable to permit of only a predetermined amount of movement of the tone-arm about its pivot. This stop device is illustrated in Figs. 4 and 5 of the drawings. A collar 18 is provided at the base of the pin 7 and a set-screw 19 extends through a threaded opening in this collar so that the screw may be tightened to secure the collar 18 upon the pin 7 in any desired angular position. In the upper face of collar 18 a notch 20 is cut, into which extends a pin 21 depending from the cross-head 12 carried by the brackets 11. As the sound-record is repro-

duced, the pin 21 turns with cross-head 12 and tone-arm 8, and at the conclusion of the reproduction comes into engagement with the wall of the notch 20, this engagement precluding any further movement of the tone-arm about its pivot. The set-screw 19 permits of adjusting the collar 18 about the pin 7, so that the turning movement of the tone-arm is arrested at the conclusion of the reproduction in every case, though the sound-records on the several disks extend inwardly from the peripheries of the disks varying distances. The collar 18 shown in Fig. 5 has a notch 20 cut therein, the side walls of which are vertically disposed. Such a collar would serve the single purpose of arresting the turning movement of the tone-arm as above described. This notch, however, may be so formed that the coaction of the end of pin 21 with a wall of the notch supplies the yielding pressure for turning the tone-arm about its pivot, and this means for supplying the yielding pressure may be used alone or in combination with the spring 16. Thus, the collar 18 shown in Fig. 4 has one wall of the notch 20 disposed at an incline, and at the beginning of the reproduction the end of pin 21 is at the top of this incline. As the reproduction continues, the end of pin 21 rides down the incline and the tone-arm drops under the influence of gravity somewhat. Such downward movement can be effected only by turning the tone-arm about its pivot and thus yieldingly pressing it in a direction to carry the stylus across the sound-record. At the conclusion of the reproduction, the pin 21 engages the opposite wall of the notch 20 in the collar 18 and arrests the turning movement of the tone-arm.

Having now described my invention, what I claim as new therein and desire to secure by Letters Patent is as follows:—

1. In a talking-machine, a sound-conveying device including a pivotally-mounted tubular member, a sound-box connected to one end of said member, and means inclosed within said sound-conveying device for exerting pressure on said tubular member to turn it about its pivot, substantially as set forth.

2. In a talking-machine, a sound-conveying device including a pivotally-mounted tubular member, a sound-box connected to one end of said member, and a spring within said sound-conveying device arranged to exert pressure on said tubular member to turn it about its pivot and to be restored to potential position in restoring said member to initial position, substantially as set forth.

3. In a talking-machine, a tubular member, a support on which said member is pivotally mounted, a sound-box connected to the free end of said member, and means for exerting pressure on said member to turn it

about its pivot, said means being brought to potential relation in mounting said member upon said support, substantially as set forth.

5 4. In a talking-machine, a tubular member, a support on which said member is pivotally mounted, a sound-box connected to the free end of said member, and a spring engaged and put under tension by said member in mounting the same upon said support, substantially as set forth.

5 5. In a talking-machine, a sound-conveying device including a support having an opening therethrough and a tubular member pivotally mounted thereon in communication with said opening, a sound-box connected to the free end of said tubular member, and means inclosed within said sound-conveying device for exerting pressure on said tubular member to turn it about its pivot, said means being brought to potential relation in mounting said member upon said support, substantially as set forth.

25 6. In a talking-machine, a sound-conveying device including a support having an opening therethrough and a tubular member pivotally mounted thereon in communication with said opening, a sound-box connected to the free end of said tubular member, and a spring within said sound-conveying device exerting pressure on said tubular member to turn it about its pivot, said spring being engaged and put under tension by said member in mounting the same upon said support, substantially as set forth.

35 7. In a talking-machine, a support having an opening therethrough, a tubular tone-arm pivotally mounted thereon in communication with said opening, a spring carried by one of said parts and engaging the wall of the opening through the other to exert pressure tending to turn said tone-arm about its pivot, and a sound-box connected to the free end of the tone-arm, substantially as set forth.

45 8. In a talking-machine, a support having an opening therethrough, a tubular tone-arm pivotally mounted thereon in communication with said opening, a spring carried by one of said parts and exerting pressure tending to turn said tone-arm about its pivot, said spring being carried into engagement with the wall of the opening through the other of said parts and put under tension thereby in mounting the tone-arm on the support, and a sound-box connected to the free end of the tone-arm, substantially as set forth.

60 9. In a talking-machine, a coupling-member having an opening therethrough, a tone-arm pivotally mounted on said member, its end entering within said opening, a post mounted on said member within the opening therein and adjacent to the end of the tone-arm, a spring secured to said post and engag-

ing the end of the tone-arm to turn the arm about its pivot and a sound-box connected to the free end of the tone-arm, substantially as set forth.

10. In a talking-machine, the combination of a holder for a sound-record, means for driving the same and the record thereon, a pivoted sound-conveying device, a reproducer connected to said device and having a stylus coacting with the record-groove, means independent of the sound-record for exerting yielding pressure on said device to move the reproducer across the sound-record so that the stylus thereof will track in the record-groove, means for arresting the movement of the sound-conveying device, and means for effecting an adjustment of said arresting means, substantially as set forth.

11. In a talking-machine, the combination of a holder for a sound-record, means for rotating the same and the record thereon, a support, a sound-conveying device pivoted thereon, reproducing mechanism including a stylus connected to said device, means independent of the sound-record for exerting yielding pressure on said device to move said mechanism across the sound-record so that the stylus thereof will track in the record-groove, coacting surfaces on said support and device brought into engagement by the movement of said device about its pivot and serving to arrest such movement, and means for effecting an adjustment of one of said surfaces, substantially as set forth.

12. In a talking-machine, the combination of a holder for a sound-record, means for rotating the same and the record thereon, a coupling-member, a vertical pin thereon, a tone-arm, a sleeve pivoted on the tone-arm and receiving said pin, a collar having a notch cut therein adjustably mounted on said pin and a projection on said sleeve entering said notch, substantially as set forth.

13. In a talking-machine, the combination of a holder for a sound-record, means for rotating the same and the record thereon, a support, a sound-conveying device pivoted on the support, reproducing mechanism connected to said device and having a stylus tracking in the record-groove, a collar on the pivot of said device having a notch cut therein one wall of which is inclined, means for securing said collar upon said pivot in various angular positions, and a projection on said device entering said notch, said projection being adapted to move down said inclined wall by gravity to exert yielding pressure on said sound-conveying device to turn it on its pivot and to engage another wall of the notch to arrest said movement, substantially as set forth.

14. In a talking-machine, the combination of a holder for a sound-record, means for rotating the same and the record thereon, a

support, a sound-conveying device pivotally
mounted thereon, reproducing mechanism
connected to said device and having a stylus
tracking in the record-groove, means actu-
5 ated by movement of said device under the
influence of gravity for exerting yielding
pressure thereon tending to turn it on its
pivot, and a spring also exerting yielding

pressure on said device, substantially as set
forth.

10

This specification signed and witnessed
this 25 day of October, 1907.

THOMAS KRAEMER.

Witnesses:

H. MEIER,

H. MUHLSCHLEGEL.

T. KRAEMER.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED DEC. 21, 1907.

Fig. 1.

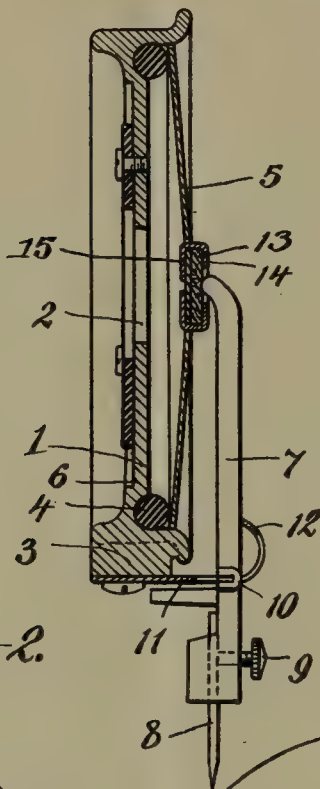
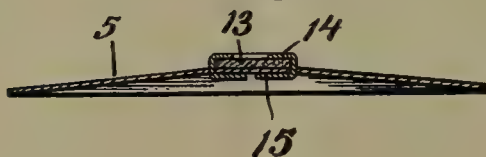


Fig. 2.

Fig. 3.



Fig. 4.



WITNESSES:

W. Edwards.
J. D. Little.

INVENTOR

Thomas Kraemer
BY *W. Edwards*
ATTORNEY

UNITED STATES PATENT OFFICE.

THOMAS KRAEMER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

SOUND-BOX FOR TALKING-MACHINES.

No. 885,490.

Specification of Letters Patent.

Patented April 21, 1908.

Application filed December 21, 1907. Serial No. 407,577.

To all whom it may concern:

Be it known that I, THOMAS KRAEMER, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

This invention relates to talking machines and has reference, more particularly, to sound-boxes for use therewith.

The invention is directed to the provision of a sound-box of an improved construction in the use of which a sound reproduction of superior tone quality is obtained and one which is, to a large extent, free from foreign sounds. This is accomplished by the employment of an improved form of diaphragm in the sound-box, this being a metallic disk having secured thereto a small body of non-metallic material which lies between the diaphragm and the lever by which the diaphragm is vibrated. The material from which this body is formed may be varied as desired and with different materials, reproductions differing in tone quality are obtained. Thus a small disk of heavy paper or of blotting paper heavily calendered may be employed, this disk being fixed to the center of the diaphragm. Preferably, the sound-box is so constructed that the diaphragm may be readily withdrawn therefrom and a number of diaphragms having non-metallic bodies of different materials fixed thereto are provided. The user of the sound-reproducing apparatus may then select and use the diaphragm which, under the particular conditions prevailing, will give the most faithful reproduction. Moreover, my improved sound-box is so constructed that it may be manufactured at low cost and the danger of breakage or displacement of the parts is reduced to a minimum.

The preferred embodiment of my invention is illustrated in the accompanying drawings in which

Figure 1 is a sectional elevation of a sound-box, Figs. 2 and 3 are views of opposite sides of the diaphragm and Fig. 4 is a sectional view of the diaphragm, the section line being transverse to that of Fig. 1.

Referring to the drawings, the sound-box is shown as having a main wall 1, an opening therethrough with which the sound-conveying

tube is adapted to be connected, and a circular flange 3 at the outer edge of the wall 1 forming the outer wall of the box. Fitting closely within wall 3 is a rubber strip or ring 4 forming a support for the diaphragm 5, this ring being retained in position by a circular ridge 6 integral with and rising from wall 1. The stylus-lever 7 is pivotally mounted upon wall 3 and at its outer end has an opening therein to receive a stylus 8, the latter being held in position by a set-screw 9. In the present instance I have shown the stylus-lever as provided with notched lugs 10 on opposite sides thereof which receive knife-edges on a sheet-metal piece 11 secured to wall 3. The end 12 of this piece is bent over and bears on lever 7, exerting a spring tension thereon tending to turn the lever about the knife-edges as pivots in a direction to press the inner end of the lever against the diaphragm.

The diaphragm 5 is a sheet-metal disk preferably pressed so that the central portion is slightly displaced from the plane of the edge portion. At the center of the disk 5 is secured a small disk 13 of non-metallic material as paper, this being held in place by an annulus 14 of light sheet-metal at opposite edges of which are integral tangs 15 extending through openings in disk 5 and turned over against the disk as shown in Figs. 3 and 4. The inner end of the stylus-lever 7 extends through the opening in the annular casing 14 and bears on the disk 13. By this construction, the vibrations of the stylus and stylus-lever are transmitted through the disk 13 to the diaphragm 5. This disk is of non-metallic material and may be of heavy paper, blotting paper having a calendered surface, or rubber of varying degrees of hardness. I have found in practice that the provision of such a non-metallic disk greatly improves the tone quality of the sound-reproduction and reduces considerably the foreign noises usually termed "scratching" and "blasting". The diaphragms constructed as shown may be manufactured at low cost and there is little liability of displacement of the parts as it will be seen that the structure is simple and the number of parts small. The sound-box is so constructed that the diaphragm may be readily removed, this requiring merely that the stylus-lever be turned on its pivot against

the tension of spring 12. A user of a talking machine may therefore have a plurality of diaphragms 5 provided with disks 13 differing in material and may use, for each reproduction, the diaphragm which will give the best results.

Having described my invention what I claim as new therein and desire to secure by Letters Patent of the United States is:

10 1. A sound-box having a diaphragm, a thin flat piece of non-metallic material, a casing therefor securing said piece to the diaphragm, a stylus-lever pivotally mounted on a wall of the box and bearing at its inner end on said piece and a stylus secured to the
15 outer end of the lever, substantially as described.

20 2. A sound-box having a diaphragm, a thin flat piece of non-metallic material, a casing therefor securing said piece to the diaphragm, said casing having an opening therethrough, a stylus-lever pivotally mount-

ed on a wall of the box and having its inner end extending through the opening in said casing and bearing on said piece, and a stylus 25 secured to the outer end of the lever, substantially as described.

3. A sound-box having a diaphragm, a disk of non-metallic material, an annular casing overlying the same and having tangs 30 extending through openings in the diaphragm and holding the casing and disk thereto, a stylus-lever pivotally mounted on a wall of the box and having its inner end extending through the opening in said casing 35 and bearing on said disk and a stylus secured to the outer end of said lever, substantially as described.

This specification signed and witnessed this 18th day of December, 1907.

THOMAS KRAEMER.

Witnesses:

JOHN A. ZOELLS,
D. S. EDMONDS.

No. 885,989.

PATENTED APR. 28, 1908.

W. FITZPATRICK.
GRAPHOPHONE NEEDLE.
APPLICATION FILED JULY 31, 1907.

FIG-1-

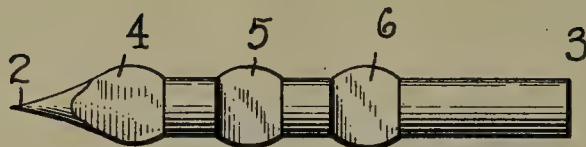


FIG-3-

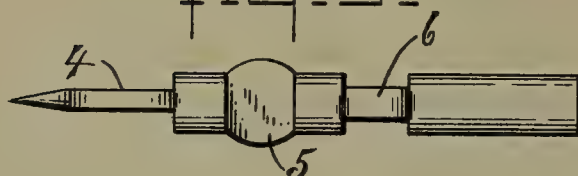
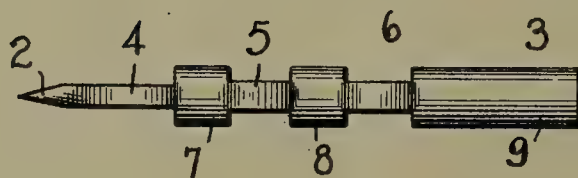


FIG-2-



Witnesses

L. B. James
F. J. Kent.

William Fitzpatrick, ^{Inventor}

By *Herrick & Herrick*

Attorneys.

UNITED STATES PATENT OFFICE.

WILLIAM FITZPATRICK, OF LOWELL, MASSACHUSETTS.

GRAPHOPHONE-NEEDLE.

No. 885,989.

Specification of Letters Patent.

Patented April 28, 1908.

Application filed July 31, 1907. Serial No. 386,437.

To all whom it may concern:

Be it known that I, WILLIAM FITZPATRICK, a citizen of the United States, residing at Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Graphophone-Needles, of which the following is a specification.

My invention relates to graphophone needles, and has for object the production of a needle of superior qualities so far as durability and tone production are concerned.

A further object is to produce a needle of such construction that the resulting tone may be modified according to the way the needle is fixed in the reproducer.

To these and other ends which will be obvious to one skilled in the art, my invention consists of the elements, combinations and arrangements of parts, all as will be hereinafter fully set forth, and succinctly defined in the annexed claims.

In the accompanying drawings, in which I have illustrated various embodiments of the invention: Figure 1 is a perspective of a needle embodying my invention; Fig. 2 is a perspective at right angles of the subject matter of Fig. 1; and Fig. 3 shows in perspective a modified form of the invention.

Referring to the numerals on the drawing, 1 indicates in a general way a phonograph or graphophone needle, having a point 2, and a butt 3, the latter adapted to be held in the reproducers. Intermediate the point and butt the needle is provided with flattened portions 4, 5, and 6 alternating with portions 7, 8 and 9 which have not been flattened. As shown in Figs. 1 and 2, the said flattened portions are in alinement, and the flat nearest the point is made thinner than the others, because at the point, and at the butt the needle is ordinarily most inflexible, while there is usually some resiliency at the middle.

In Fig. 3 I have shown a modification, in which alternate flats are at angles to each

other. By this construction the needle is flexible, no matter whether the needle be secured in the reproducer so that a particular flat is alined with the line of travel of the point, or at an angle to said line of travel.

By the construction shown in the other figures, if the needle is so held that the flats lie in a plane transverse to the line of travel of the point, there will be greater flexibility in the needle, and the tone will be modified, and free from roughness. If it be desired to produce a loud, strident tone, the needle is arranged so that the flats are in line with the line of travel of the point; the needle is now less flexible in the direction in which the bending tendency occurs, consequently there is rougher vibration.

It is to be understood that I do not limit myself herein to specific forms, materials, or relations, other than those set out in the claims, except such as may be necessary to practically embody the invention there defined.

What I claim is:—

1. A phonograph needle provided with a series of flattened portions arranged at intervals between the point and the butt thereof, one of said flattened portions being thinner than the others.

2. A phonograph needle provided with a series of flattened portions arranged at intervals between the point and the butt thereof, the flattened portion nearest the point being thinner than the others.

3. A phonograph needle provided with a series of flattened portions arranged at intervals between the point and the butt thereof, alternate flattened portions being arranged at an angle to each other.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM FITZPATRICK.

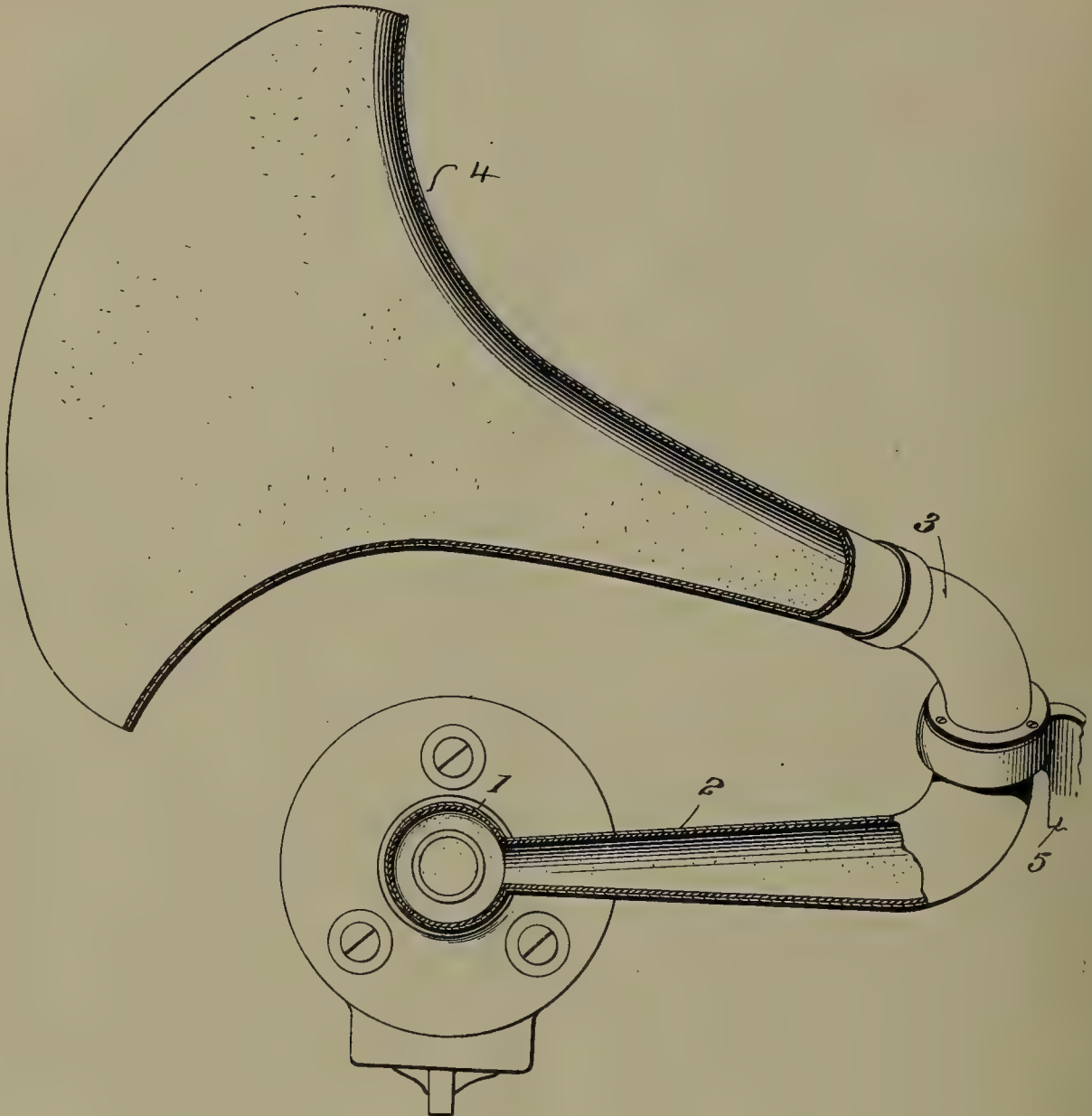
Witnesses:

JOHN J. DEVINE,
JOHN KEARNEY.

No. 886,056.

PATENTED APR. 28, 1908.

J. O. HIRSCHFELDER.
GRAPHOPHONE, PHONOGRAPH, AND THE LIKE.
APPLICATION FILED JULY 16, 1907.



Witnesses

H. E. Klein.
L. B. Baker.

Inventor

Joseph Carlant Hirschfelder

By Dudley, Brown & Phelps

Attorneys

UNITED STATES PATENT OFFICE.

JOSEPH OAKLAND HIRSCHFELDER, OF SAN FRANCISCO, CALIFORNIA.

GRAPHOPHONE, PHONOGRAPH, AND THE LIKE.

No. 886,056.

Specification of Letters Patent.

Patented April 28, 1908.

Application filed July 16, 1907. Serial No. 384,014.

To all whom it may concern:

Be it known that I, JOSEPH OAKLAND HIRSCHFELDER, citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Graphophones, Phonographs, and the Like, of which the following is a specification.

10 My invention relates to improvements in the sounding box, sound conducting tubes and horns employed to conduct sound from graphophones, phonographs, talking machines and the like, sound reproducing instruments, and it has for its object the provision of means whereby the vibrations of such parts are prevented or reduced to a minimum.

20 In the carrying out of my invention I avoid all vibrating edges in the instrument by covering or protecting the same so as to make the whole sound conducting part a simple tube which gives no secondary or accessory vibrations, thereby preventing the 25 metallic or harsh effect produced by the sound waves from such instruments and preserving the natural tone of the vocalization when such instruments are producing reproductions of the human voice, and the true 30 resonant character of the notes when the same is used in the reproduction of vocal and instrumental music.

35 In the accompanying drawing illustrating my invention the figure shown is a central longitudinal section through the sound box, conducting tube, elbow and horn of a sound reproducing instrument.

1 is the sound box and 2 the sound conducting tube extending therefrom.

40 3 is an elbow tube connecting the outer end of the tube 2 with the inner end of the horn 4.

5 designates a bracket supporting the horn sections.

45 The horn 4 may be made from pasteboard, papier-mâché, or metal, but I have found that the best effect results from the use of pasteboard as the material therefor.

I line the sound box, the tubes leading therefrom and the horn with a lining of rub-

ber, felt, cloth or other similar material, 50 such lining being secured smoothly in place either by mechanical means or by the use of paste or other suitable adhesive compound. This lining may be made as a continuous tube throughout the connecting sound con- 55 ducting parts, or each one of such parts may be provided with a separate lining. The material must however be placed on the interior of each of the sound producing parts to produce the desired result. The sound 60 waves passing through the sound conducting parts provided with my improvement do not cause the mechanical vibrations present in such parts not provided therewith, and freedom from the objectionable features herein 65 recited is thus secured.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A horn for phonographs or similar instruments, comprising a tapered portion and an elbow portion both of which parts are lined throughout with a continuous sound deadening material consisting of rubber, felt, or cloth, as set forth. 75

2. The combination with a horn for phonographs or similar instruments, comprising a tapered portion and an elbow portion, both of which parts are lined throughout with a continuous sound deadening material, of a 80 sound box to which such horn is adapted to be connected, said sound box being also lined with sound deadening material, as set forth.

3. The combination with a horn for phonographs or similar instruments, comprising a 85 tapered portion and an elbow portion, both of which parts are lined throughout with a continuous sound deadening material consisting of rubber, felt, cloth, or the like, of a sound box to which said horn is connected 90 and the interior of which is lined with the material constituting the lining of the horn.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPH OAKLAND HIRSCHFELDER.

Witnesses:

DANIEL BLOCK,
WILFRED LYMAN.

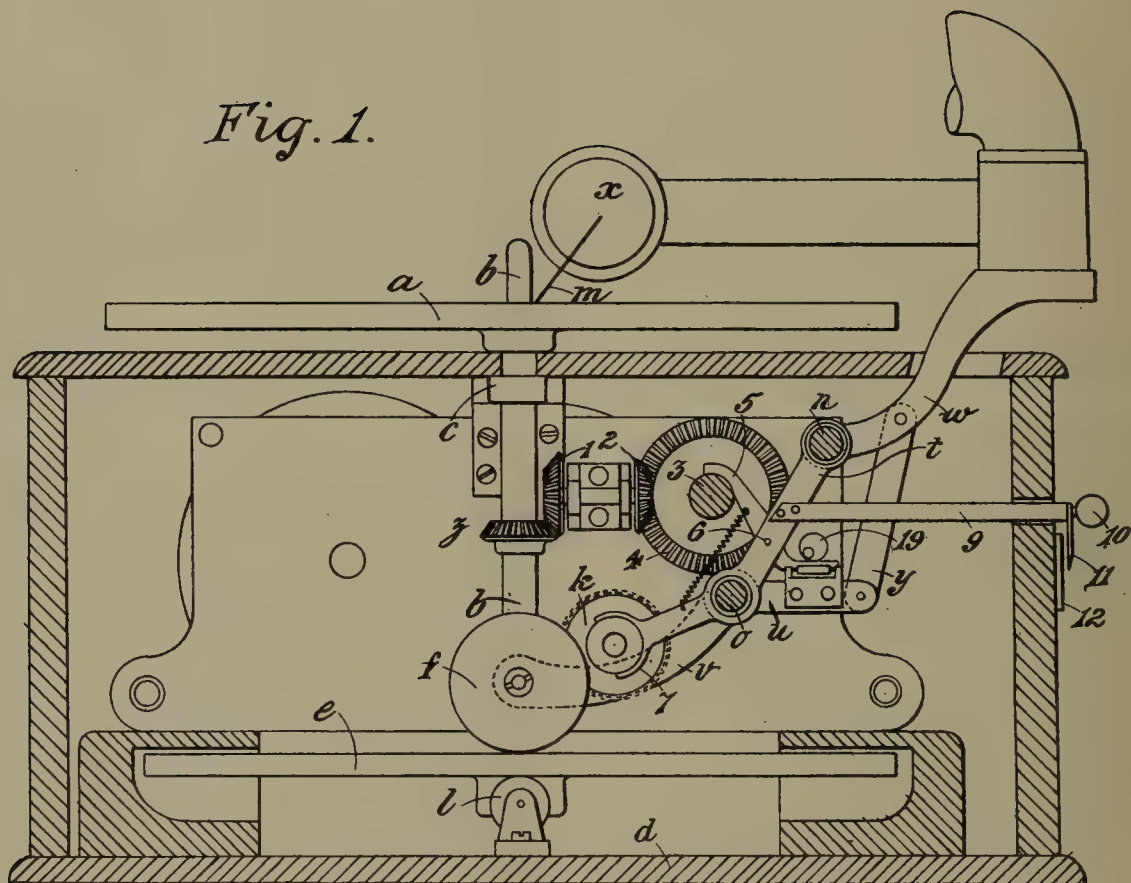
No. 887,429.

PATENTED MAY 12, 1908.

L. ROSENTHAL.
APPARATUS FOR RECORDING AND REPRODUCING SOUND.

APPLICATION FILED OCT. 10, 1907.

2 SHEETS—SHEET 1.



WITNESSES. _____ ITZVETZTOR,
Wm. D. Zell, Louis Rosenthal
Chas. Kaufmann, by G. Arthur Leuward,
attys.

L. ROSENTHAL.
APPARATUS FOR RECORDING AND REPRODUCING SOUND.

APPLICATION FILED OCT. 10, 1907.

2 SHEETS—SHEET 2.

Fig. 2.

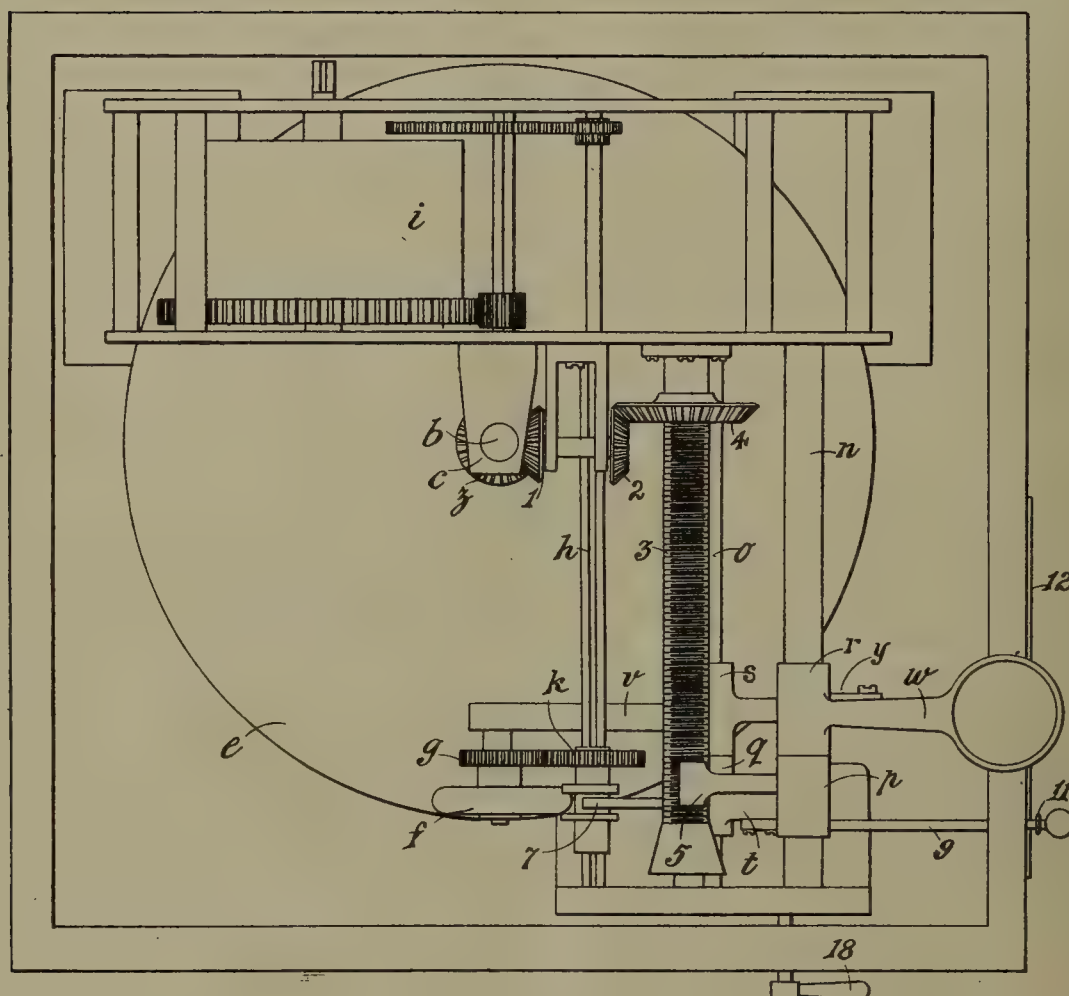
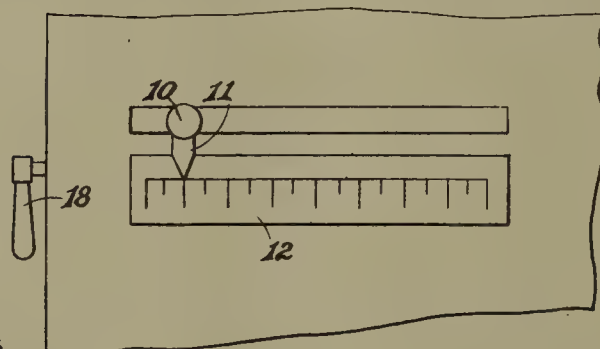


Fig. 3.



WITNESSES

Wm. Drell.
Chas. Kaufmann.

INVENTOR
Louis Rosenthal
Gardner Stewart,
att'y.

UNITED STATES PATENT OFFICE.

LOUIS ROSENTHAL, OF FRANKFORT-ON-THE-MAIN, GERMANY.

APPARATUS FOR RECORDING AND REPRODUCING SOUND.

No. 887,429.

Specification of Letters Patent.

Patented May 12, 1908.

Application filed October 10, 1907. Serial No. 396,757.

To all whom it may concern:

Be it known that I, LOUIS ROSENTHAL, a subject of the Emperor of Germany, residing at Frankfort-on-the-Main, Germany, have
5 invented certain new and useful Improvements in Apparatus for Recording and Reproducing Sound, of which the following is a specification.

It is a generally felt disadvantage in the
10 known machines or apparatus for recording and reproducing sounds that the capacity of the record-disks for recording the sounds is very limited in proportion to the size of the disks. This results from the fact that the
15 length of the spiral path of the stylus on the rotating disk corresponding to one revolution of said disk increases with each revolution of the same so that, since the speed of rotation of the disk remains the same, continuously increasing intervals must occur
20 between the records of the separate sounds in the spiral grooves in order to maintain uniform sequence of the sounds in reproduction. If this were not so, disks of the size at present
25 in general use could easily receive up to three times the number of sounds heretofore possible. Recognizing this disadvantage, it has been proposed to drive the said disk carrier through a stationary friction disk and to
30 move the disk carrier laterally by means of its support in proportion to the relative advance of the stylus, but this suggestion has not been carried out practically because the apparatus would become too bulky on
35 account of having to provide room for the two extreme positions of the disk carrier, an even more cogent reason being that the lateral motion of the disk carrier causes loosening in the bearings, which gives rise to vibrations detrimental to sound reproduction. This latter effect is enhanced by the
40 direct driving of the disk carrier from the friction disk which, since it exercises a one-sided pressure on the disk carrier, is liable to cause wobbling and jamming. By the solution found in the present invention these disadvantages are obviated. The disk carrier is driven in such a manner as to completely remove the load therefrom, and its speed of
50 rotation is decreased in proportion to the advance of the stylus.

The inclosed drawings show in Figure 1 a side view, Fig 2 top view, Fig. 3 a detail.

The disk carrier *a* is firmly mounted on
55 shaft *b* which has an upper bearing *c* and runs at the bottom in a step bearing on the

base *d*. On the same shaft near *d* is firmly mounted a disk *e* equal in size to the disk carrier *a*, and by which shaft *b* is driven. Disk *e* is driven by the friction disk *f*, coupled
60 with a spur wheel *g* gearing with a spur wheel *k* on shaft *h* which is driven by a clockwork *i* in known manner. For the purpose of resisting the pressure exercised by friction roll *f* on disk *e* underneath the latter near its periphery a roll *l* is arranged, on which disk *e*
65 runs.

The simultaneous and uniform advance of the stylus *m* is synchronized with that of friction roll *f* as follows:—Two guide rods *n*,
70 *o* are arranged across the casing of the apparatus for guiding four boxes *p*, *q*, *r*, *s*. Two of these *p* and *q* are rigidly joined by a rod *t* preventing them from turning, whereas *r* and *s* are rotatable but is coupled with the non-
75 rotatable box mounted on the same guide rod in such manner that all four boxes can only move together. On the box *s* is mounted the two-armed lever *u*, *v*, the arm *v* of which carries at its end the friction disk *f*
80 with the spur wheel *g*; on the box *r* is mounted the arm *w* which is suitably formed to carry the sound box *x* with the diaphragm. The joint piece *y* connects the arms *u*, *w*. From the shaft *b* by means of bevel-wheels
85 *z*, 1, 2, is driven the spur wheel 4, mounted on the shaft 3. Shaft 3 is screw threaded, and on it rests the spring-pressed hammer 5, which on rotation of shaft 3 moves along said shaft like a nut. The hammer
90 5 is pivotally mounted at 6 on the bar *t*. The hammer when moving therefore takes with it all four boxes *p*, *q*, *r*, *s* and all the parts mounted thereon including the sound box and the friction roll *f*. In order that the
95 spur-wheel *k* shall participate in this simultaneous movement, there is provided a fork 7 mounted on the box *q*.

When the whole mechanism has arrived at its end position, it is released to permit its return
100 by lifting the hammer 5, the diaphragm and the friction roll *f*. For this purpose, by means of the handle 18, a cam 19 is moved which consists of a transversely extending rod. At the commencement of this movement,
105 the cam presses on the tail of the hammer 5 thereby lifting it from shaft 3. The further rotation of the cam actuates the arm *u* thereby moving simultaneously the sound box *w* and the arm *v*, whereby the diaphragm
110 and the friction roll *f* are lifted. To render the returning of the mechanism to its origi-

nal position quick and handy there is provided a rod 9 having a button 10 serving as a handle. A hand or pointer 11 likewise mounted on the rod 9 and moving in front of a scale 12 is arranged for the purpose of enabling record disks of the old systems to be used in my improved apparatus. The record disks now in common use require to be rotated at a definite speed in order to give correct reproduction of the sounds, and scale 12 indicates the speed at which the disk carrier rotates at each different position of the pointer. As in this case the speed of rotation should not be variable, the cam 8 must be turned till the hammer 5 is released; the friction roll *f* and the diaphragm however still remain in the driving position.

What I claim is:—

1. An apparatus for recording and reproducing sounds, said apparatus comprising a rotatably mounted carrier-disk for a record plate, a motor, a friction-roller coacting with a plane surface rotating with said disk, a sound-box, means controlled by the sound-box for positively moving said friction-roller axially in a direction substantially radial to said surface, and means for rotatably and movably connecting said friction roller with said motor.

2. An apparatus for recording and reproducing sounds, said apparatus comprising a rotatably mounted carrier-disk for a record plate, a friction-disk fixed to and rotating with said carrier-disk, an anti-friction roller for supporting said friction-disk, a motor, a shaft driven by said motor, a friction-roller driven by said shaft and adjustably connected thereto so as to be capable of moving in a direction substantially radial to said friction-disk, a sound-box, guides for said sound-box, gearing connecting said carrier-disk and said sound-box and a positive connection between said sound-box and said friction-roller.

3. In an apparatus for recording and reproducing sounds, a motor-shaft, a friction-roller driven by said shaft and adjustable along the same, guides extending substantially parallel to said shaft, boxes or guide-sleeves movable on said guides, a sound-box carried on said guide-sleeves, a frame mounted on said guide-sleeves and bearing said friction-roller, and means for moving said guide-sleeves along said guides.

4. In an apparatus for recording and reproducing sounds, a motor-shaft, a friction-roller driven by said shaft and adjustable along the same, guides extending substantially parallel to said shaft, boxes or guide-sleeves movable on said guides, a sound-box carried on said guide-sleeves, a frame mounted on said guide-sleeves and bearing

said friction-roller, a rotatably mounted record-carrier disk driven by said friction-roller, a feed-screw, gearing connecting said carrier-disk and said feed-screw, and a hammer mounted on said guide-sleeves and having female screw-threads and detachably engaging said feed-screw.

5. In an apparatus for recording and reproducing sounds, a motor-shaft, a friction-roller driven by said shaft and adjustable along the same, guides extending substantially parallel to said shaft, boxes or guide-sleeves movable on said guides, a sound-box carried on said guide-sleeves, a frame mounted on said guide-sleeves and bearing said friction-roller, a rotatably mounted record-carrier disk driven by said friction-roller, a feed-screw, gearing connecting said carrier-disk and said feed-screw, a hammer mounted on said guide-sleeves and having female screw-threads and detachably engaging said feed-screw, and gearing mounted in said frame and connecting said friction-roller and said motor-shaft.

6. An apparatus for recording and reproducing sounds, said apparatus comprising a record-carrier-disk, a rotatably mounted shaft bearing said carrier-disk, a friction-disk fixed on said shaft, an anti-friction roller supporting said friction-disk, a feed-screw, gearing connecting said carrier-disk and said feed-screw, guide-ways, a carriage movable on said guide-ways, a sound-box on said carriage, a segmental nut on said carriage, means for bringing said nut into and out of engagement with said feed-screw, a friction-roller rotatably mounted in said carriage and coacting with said friction-disk, a motor, a shaft driven by said motor, and gearing mounted in said carriage and rotatably connecting said motor shaft and said friction-wheel.

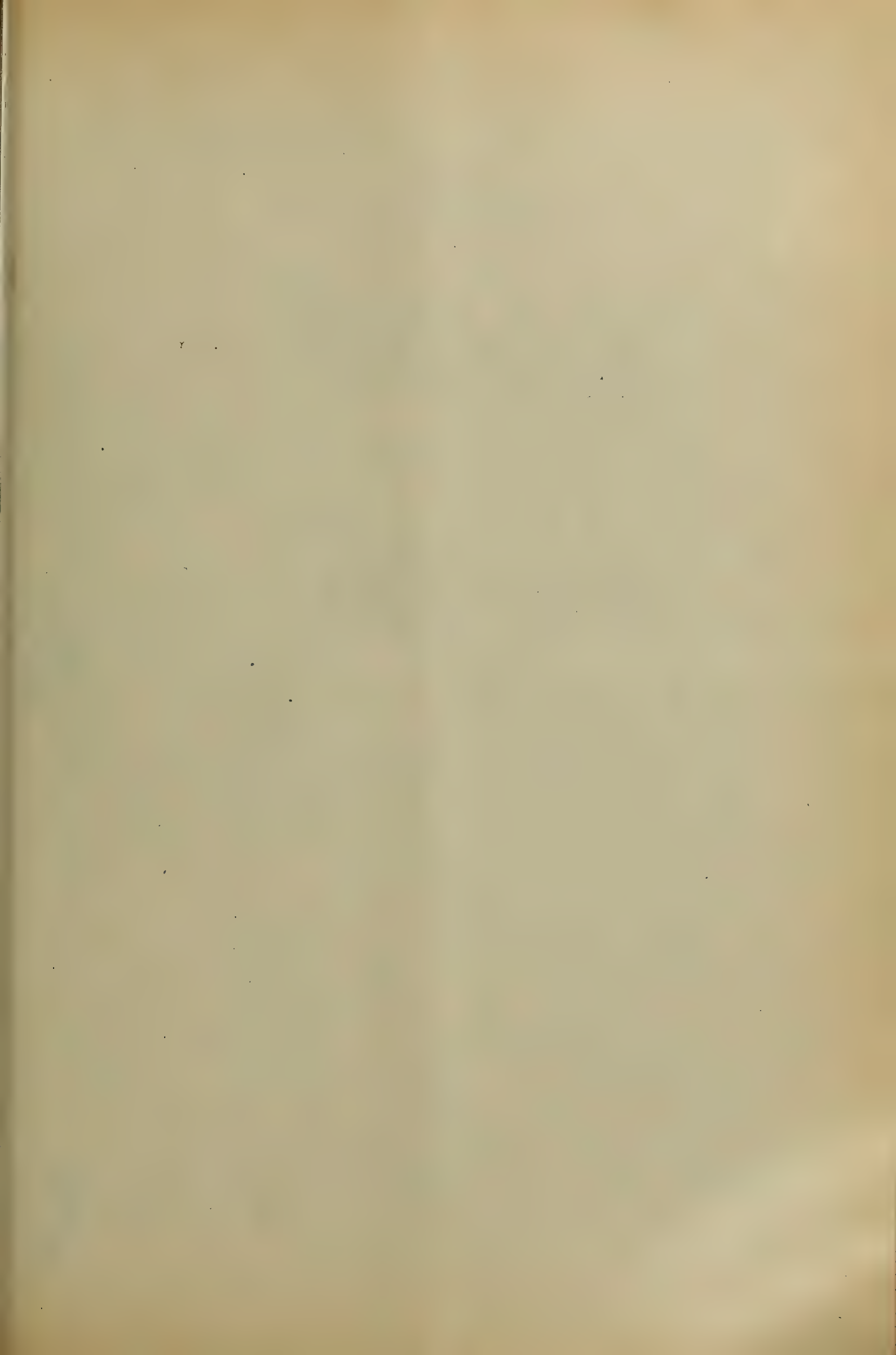
7. In an apparatus for recording and reproducing sound, the combination of a rotary part comprising the record carrier disk, means for rotating said part comprising a friction roller, bearing against said part and movable radially thereof, the sound-box, operative connecting means between the friction roller and the sound-box whereby to effect the movement of the friction roller radially of said rotary part and means for rotating the friction roller, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

LOUIS ROSENTHAL.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.



No. 887,657.

PATENTED MAY 12, 1908.

T. KRAEMER.
SOUND BOX FOR TALKING MACHINES.

APPLICATION FILED JULY 15, 1907.

Fig. 1.

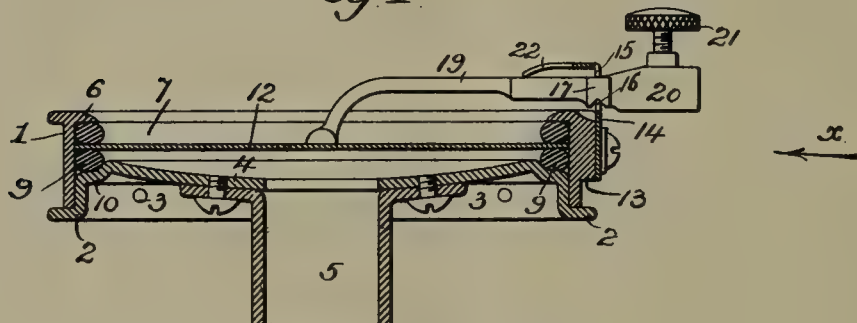


Fig. 2.

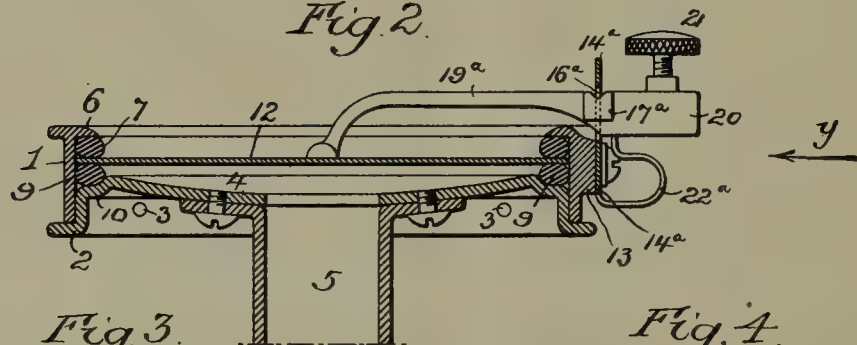


Fig. 3.

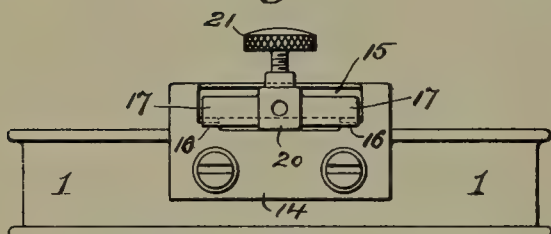


Fig. 4.

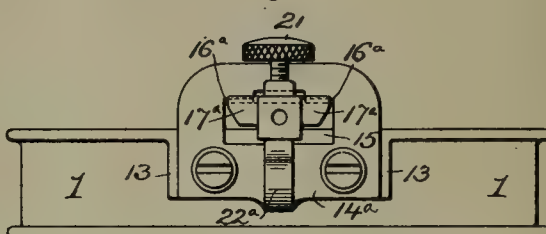


Fig. 5.

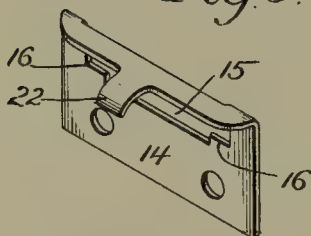


Fig. 6.

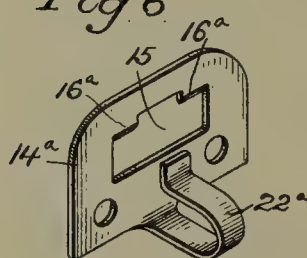
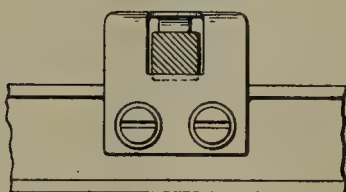


Fig. 7.



Witnesses
Harry L. Smith
Kate A. Beadle

Inventor
Thomas Kraemer
by his Attorneys
Smith & Bazier

UNITED STATES PATENT OFFICE.

THOMAS KRAEMER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

SOUND-BOX FOR TALKING-MACHINES.

No. 887,657.

Specification of Letters Patent.

Patented May 12, 1908.

Application filed July 15, 1907. Serial No. 383,720.

To all whom it may concern:

Be it known that I, THOMAS KRAEMER, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

The object of my invention is to so construct a sound box for talking machines that it will comprise but few parts, each of simple and inexpensive construction. This object I attain in the manner hereinafter set forth, reference being had to the accompanying drawing, in which

Figure 1 is a transverse vertical section of one form of sound box constructed in accordance with my invention; Fig. 2 is a similar view of another form of sound box embodying the invention; Fig. 3 is a view of the sound box shown in Fig. 1, looking in the direction of the arrow *x*; Fig. 4 is a view of the sound box shown in Fig. 2 looking in the direction of the arrow *y*; Fig. 5 is a perspective view of one of the elements of the sound box shown in Fig. 1; Fig. 6 is a perspective view of the corresponding element of the sound box shown in Fig. 2, and Fig. 7 is a view illustrating a modification of my invention.

The casing of the sound box shown in Figs. 1 and 3 comprises a pair of rings 1 and 2 fitting snugly one inside of the other and secured in position by means of transverse screws or pins 3, the ring 2 having formed integral with it a centrally perforated disk 4, to which is attached the tube 5 of the sound box in the ordinary manner. The ring 1 has an inwardly projecting flange 6, which constitutes a seat for a ring 7 of rubber or other elastic material, and between the latter and a corresponding ring 9, adapted to an annular seat 10 on the disk 4, is confined the diaphragm 12 of the sound box.

To a boss 13 on one side of the ring 1 is secured a plate 14 of steel or other sheet metal, in which is formed a slot 15 whose bottom wall presents knife-edged lugs 16 which constitute pivotal bearings for oppositely projecting trunnions 17 on the stylus lever 19, the inwardly projecting arm of the latter being bent so as to bear upon the center of the diaphragm 12, and the outwardly projecting

arm of the lever presenting a socket 20 with set screw 21 for the reception and retention of the stylus.

The upper portion of the plate 14 is bent forwardly and terminates in a projecting central spring finger 22, which bears upon the back of the stylus lever 19 and serves to maintain its inner end positively in contact with the diaphragm 12. The only difference between the sound box shown in Figs. 2 and 4 and that shown in Figs. 1 and 3 lies in the conformation of the stylus lever trunnions and of the plate which serves as the fulcrum and spring for the stylus lever. This plate is shown at 14^a in Figs. 2 and 4, and it has the knife-edged lugs 16^a formed on the upper wall of the slot 15^a, the fulcrum notches of the stylus lever 19^a being formed in the upper faces of the trunnions 17^a instead of in the under faces of the same. The bent upper portion of the plate is dispensed with and the tension spring 22^a is projected from the lower edge of the plate 14^a and is bent so as to press upwardly upon the outwardly projecting arm of the stylus lever, as shown in Fig. 2, with the same effect as that exerted by the downwardly pressing finger 22 of the box shown in Fig. 1.

Although I prefer to provide the stylus lever with laterally projecting trunnions and the fulcrum plate with corresponding laterally separated fulcrum lugs, I may, in some cases, modify such construction by forming the fulcrum notch directly in the stylus lever and mounting the latter upon a wall of the slot, Fig. 7 illustrating such a modification as applied to a sound box of the type shown in Figs. 1 and 3, but it will, of course, be understood that like modifications can be made in the construction of a sound box of the type shown in Figs. 2 and 4.

I claim:—

1. The combination of a sound box casing, a plate secured thereto and having a slot therein, and a stylus lever passing through said slot and fulcrumed directly upon one of the walls of the same.

2. The combination of a sound box casing, a plate secured thereto and having a slot therein, a stylus lever passing through said slot and fulcrumed upon one of the walls thereof, and a spring on the plate bearing

upon but being disconnected from the stylus lever and serving to maintain said fulcrum bearing.

3. The combination of a sound box casing, 5 a plate secured thereto, and having a slot therein, a stylus lever passing through said slot and fulcrumed upon one of the walls of the same, and a spring constituting an integral part of said plate, said spring bearing 10 upon but being disconnected from the stylus lever and serving to maintain the fulcrum bearing of the latter.

4. The combination of a sound box casing, a stylus lever having notched trunnions, a 15 plate slotted for the reception of said trunnioned portion of the stylus lever and having projecting fulcrum lugs for said trunnions, and a spring constituting an integral part of said plate, said spring bearing upon the stylus 20 lever, and serving to maintain its notched trunnions in contact with said fulcrum lugs.

5. The combination of the sound box casing, its diaphragm and stylus lever, a plate secured to said casing and presenting a ful- 25 crum for said stylus lever, and a spring bearing upon but being disconnected from the back of the stylus lever and serving to press the same towards the diaphragm and fulcrum.

30 6. The combination of the sound box casing its diaphragm and stylus lever, a plate secured to said casing and presenting a fulcrum for said stylus lever, and a spring constituting an integral part of said plate, said 35 spring bearing upon the back of the stylus lever and serving to press the same towards the diaphragm and fulcrum.

7. A combined fulcrum and spring plate

for the stylus lever of a sound box, said plate having a fulcrum for the stylus lever, and a 40 projecting spring tongue for bearing upon the lever and pressing the same towards said fulcrum.

8. A combined fulcrum and spring plate for the stylus lever of a sound box, said plate 45 having a slot for the reception of the stylus lever, and a projecting spring tongue for bearing upon the lever and pressing the same towards one of the walls of the slot.

9. A combined fulcrum and spring plate 50 for the stylus lever of a sound box, said plate having a slot with laterally separated fulcrum lugs therein and a spring tongue for pressing the stylus lever towards said fulcrum lugs. 55

10. A combined fulcrum and spring plate for the stylus lever of a sound box, said plate having a slot whose bottom wall constitutes a fulcrum for the lever, and a bent top mem- 60 ber constituting a spring for bearing upon the back of the lever.

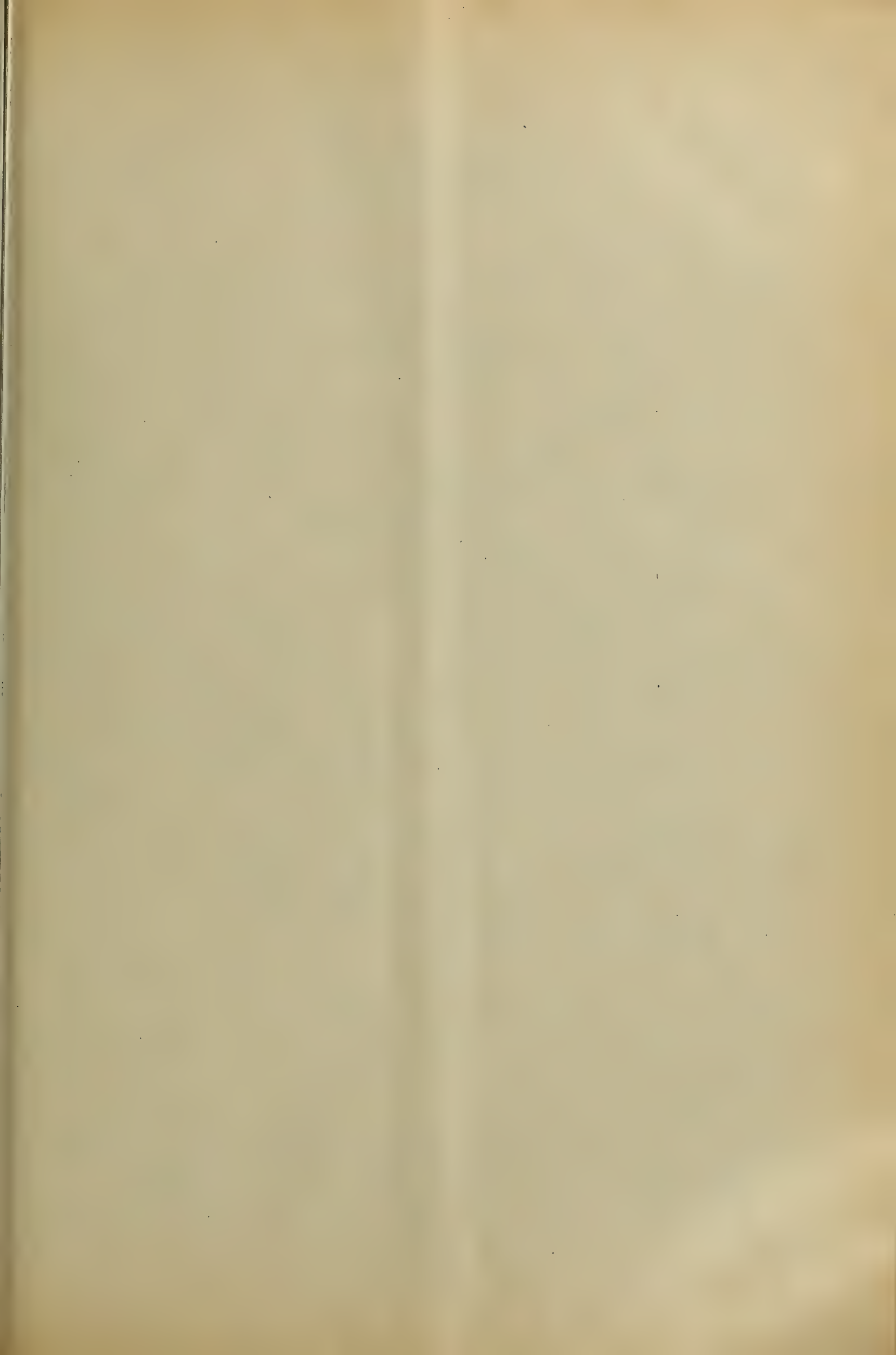
11. A combined fulcrum and spring plate for the stylus lever of a sound box, said plate having a slot whose bottom wall presents laterally separated lugs constituting a ful- 65 crum for the lever, and a bent top member constituting a spring for bearing upon the back of the lever.

In testimony whereof I have signed my name to this specification in the presence of 70 two subscribing witnesses.

THOMAS KRAEMER.

Witnesses:

HAMILTON D. TURNER,
KATE A. BEADLE.



No. 887,833.

PATENTED MAY 19, 1908.

J. T. MYGIND.
PHONOGRAPH REPRODUCER.
APPLICATION FILED JUNE 4, 1907.

Fig. 1.

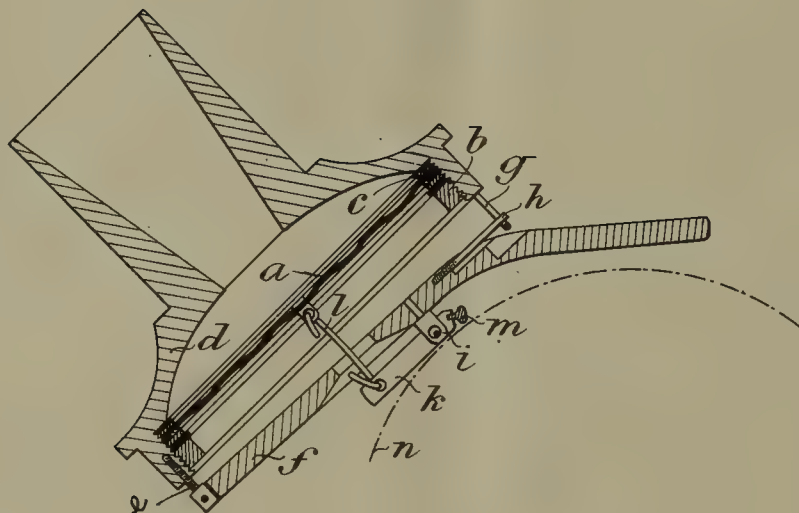
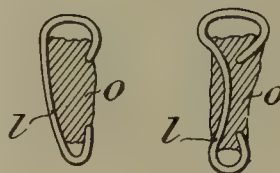
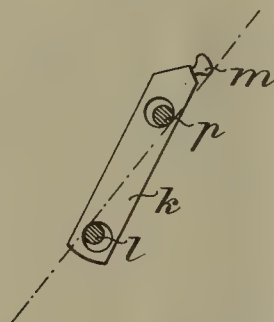
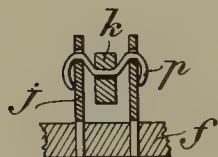


Fig. 2. Fig. 3. Fig. 4. Fig. 5.



WITNESSES
W. P. Burke
L. Noyek.

INVENTOR
Jörgen Tvede Mygind.
By *Wm. H. Hallau* ATTORNEY

UNITED STATES PATENT OFFICE.

JÖRGEN TVEDE MYGIND, OF COPENHAGEN, DENMARK.

PHONOGRAPH-REPRODUCER.

No. 887,833.

Specification of Letters Patent.

Patented May 19, 1908.

Application filed June 4, 1907. Serial No. 377,233.

To all whom it may concern:

Be it known that I, JÖRGEN TVEDE MYGIND, polytechnician, subject of Denmark, residing at Gl. Kongevej No. 138, Copenhagen, Denmark, have invented new and useful Improvements in Phonograph-Reproducers, of which the following is a specification.

The object of the present invention is to make the connection between pin and sounding membrane of the reproducing-part of Edison's and similar phonographs specially light and of easy movement as well as free from secondary sounds, thereby obtaining a more delicate and purer reproduction than when using the usual reproducers of this kind.

The principal feature of the invention consists in the lever which carries the pin, and which is connected to the membrane through a link, being arranged in such a manner that its three points of engagement, viz: the point of contact between the pin and the cylinder, the point of action of the connecting link, and finally the fixed fulcrum of the lever, situated between these two movable points, lie as far as possible in a straight line.

According to the well-known laws of the lever, the aforesaid arrangement affords the most favorable conditions for an easy movement, and consequently a more delicate reproduction may be obtained than by means of the usual form of the lever, in which the three points in question form the corners of a triangle. Besides this, the invention provides for a suitable suspension of the lever and a certain amount of damping of the connecting-link, so that the formation of secondary sounds at these places is avoided.

The invention is illustrated on the accompanying drawing, in which

Figure 1 shows a section through the reproducer, Fig. 2 a cross section of the lever through the suspension in the fulcrum, Fig. 3 the placing of the three points of engagement of the lever on a straight line, and Figs. 4 and 5 each a form of the connecting link.

a Fig. 1, is a membrane of copper or other suitable material the edge of which is by means of the screw-threaded clamping ring *b* firmly wedged in between soft disks *c* of india-rubber, paper or the like.

d is the external casing to which the funnel (not shown) is fitted, and which by means of

a hinge *e* supports the usual plate-piece *f*, the top of which is bent back. The natural propensity of this to clap down is counteracted for example by a lug *g* fitted onto the casing, engaging a pin *h*.

A fork piece *i* (see Fig. 1) or two separate pieces *j* (see Fig. 2) with bearings serve as suspension means for the lever *k*, which is, through the piece *l*, connected to the center of the membrane, and at its opposite end said lever carries the pin *m* which slides on the cylinder *n*.

As mentioned above, and as indicated in Fig. 3 the three points of engagement are placed as nearly as possible on a straight line. Hereby is also attained the possibility of materially decreasing the bulk of the lever.

In order to effect a certain amount of damping on the connecting link *l* so as to avoid deleterious independent motion, it is provided with a lump *o* of sealing wax or shellac or the like fused onto it.

For the same reason instead of the usual suspension of the lever by means of a screw the suspension means as shown in Fig. 2 is used, which consists in a piece of wire *p*, bent to the shape of a crank, which is held in place by its own tension.

Having now particularly described and ascertained the nature of this said invention and in what manner the same is to be performed I declare that what I claim is:

1. A reproducing device for phonographs comprising a casing, a membrane therein, a forked member on the casing having openings therein, a lever, a pin carried by one end of the lever, a link connecting the other end to the membrane, and a wire bent as a crank on which the lever is carried, the ends of said wire passing through the openings in the forked member, and being held in place by its own tension.

2. A reproducing device for phonographs comprising a casing, a membrane therein having an eye-bolt thereon, a lever pivoted on the casing, a pin carried by one end of the lever and a bent wire connecting the other end of the lever to the eye bolt on the membrane, and a mass fused into the bent wire.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JÖRGEN TVEDE MYGIND.

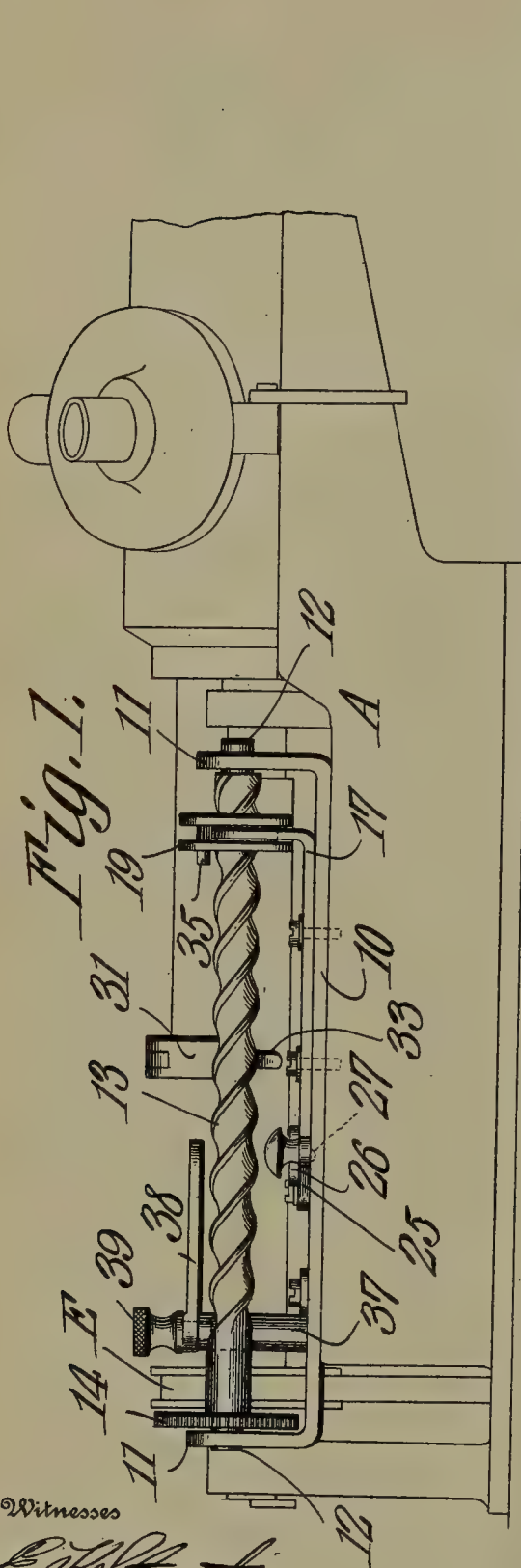
Witnesses:

P. HOFMAN-BANZ,
ERNEST BOUTARD.

J. H. STINSON.
REPEATING ATTACHMENT FOR PHONOGRAPHS.

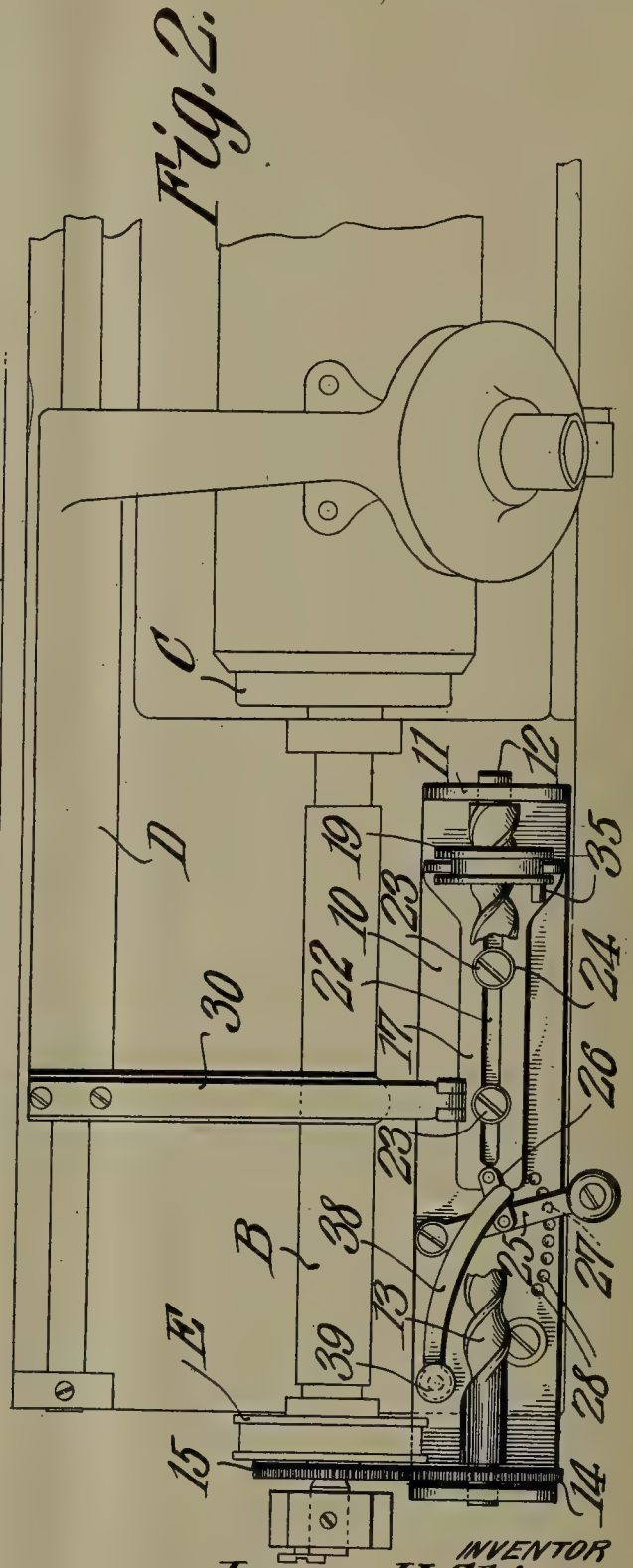
APPLICATION FILED DEC. 7, 1907.

2 SHEETS—SHEET 1.



Witnesses

E. H. Stewart
John C. Parker



INVENTOR

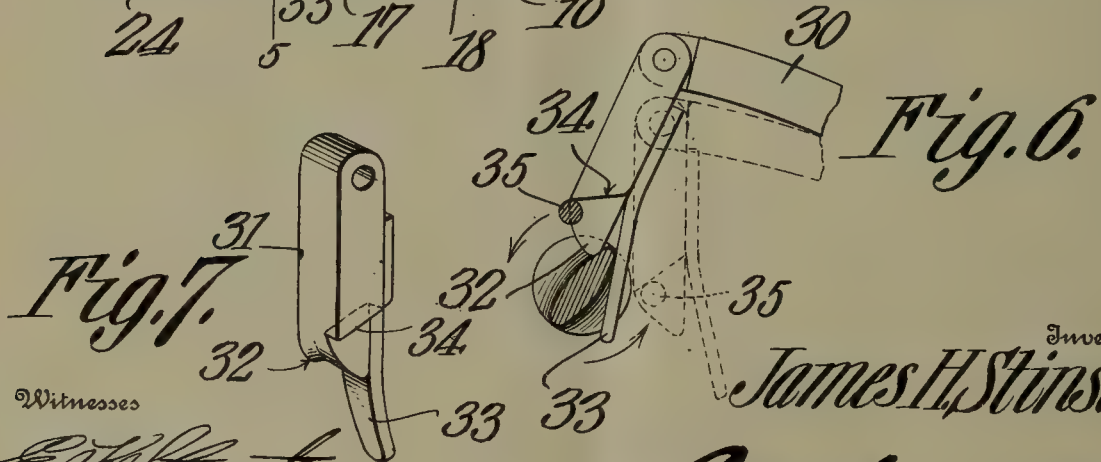
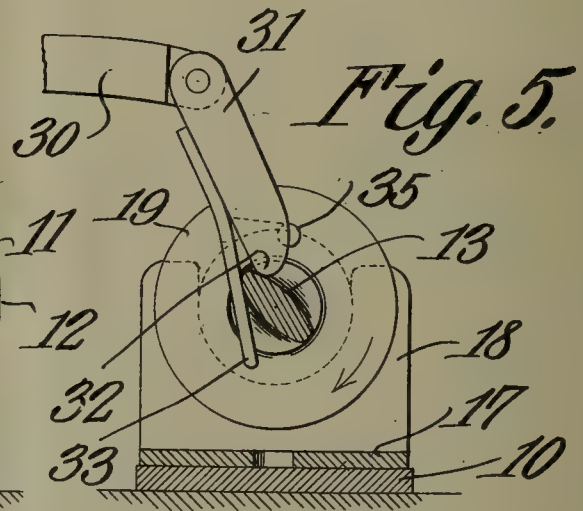
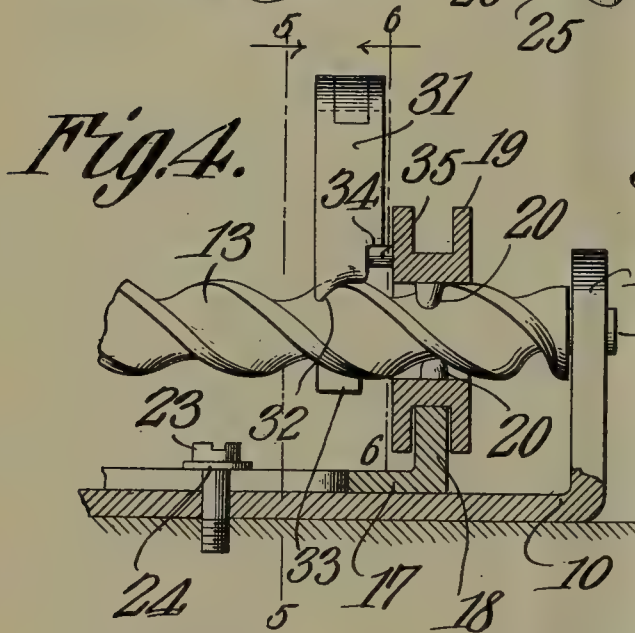
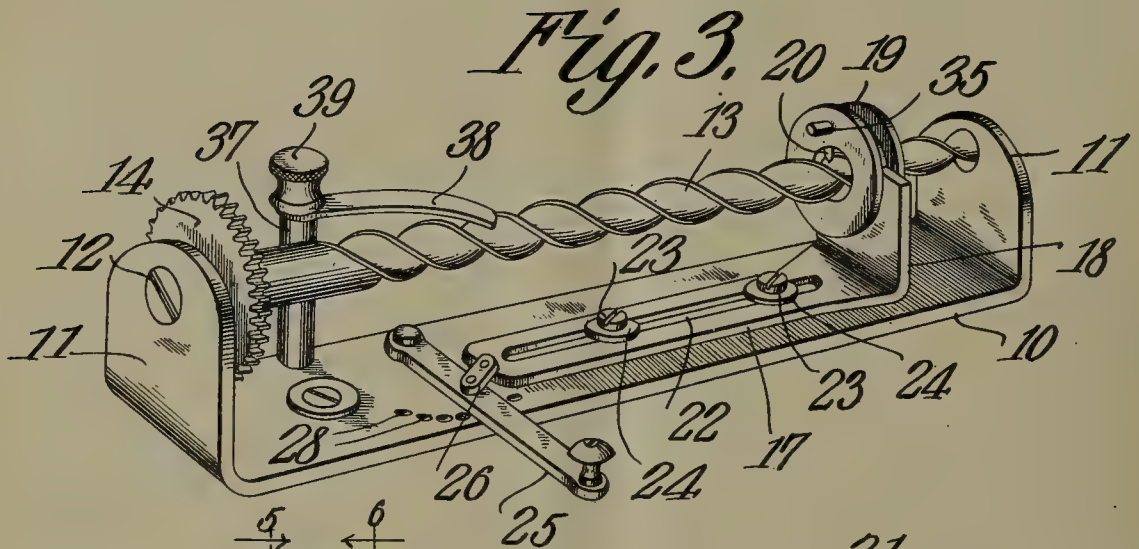
By

James H. Stinson
C. A. Snow & Co.
Attorneys

J. H. STINSON.
REPEATING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED DEC. 7, 1907.

2 SHEETS—SHEET 2



Witnesses

E. J. [Signature]
J. M. [Signature]

By

James H. Stinson.
Ca Snow & Co.
Attorneys

UNITED STATES PATENT OFFICE.

JAMES H. STINSON, OF COOKE, MONTANA.

REPEATING ATTACHMENT FOR PHONOGRAPHS.

No. 887,978.

Specification of Letters Patent.

Patented May 19, 1908.

Application filed December 7, 1907. Serial No. 405,628.

To all whom it may concern:

Be it known that I, JAMES H. STINSON, a citizen of the United States, residing at Cooke, in the county of Park and State of Montana, have invented a new and useful Repeating Attachment for Phonographs, of which the following is a specification.

This invention relates to repeating attachments for phonographs.

The principal object of the invention is to provide a device of simple construction which may be readily attached to existing phonographs and like sound reproducing machines for the purpose of returning the sound box carriage to the starting point after the completion of each reproducing operation.

A further object of the invention is to provide a device of this type that may be quickly and accurately adjusted for the purpose of starting the return movement as soon as the reproduction is completed, so that the reproducing stylus will not be compelled to travel over a blank portion of the record.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings:—Figure 1 is a front elevation of a phonograph provided with a repeating attachment constructed in accordance with the invention. Fig. 2 is a plan view of the same. Fig. 3 is a detail perspective view of the attachment complete. Fig. 4 is a vertical sectional view of a portion of the same on an enlarged scale. Fig. 5 is a transverse section on the line 5—5 of Fig. 4. Fig. 6 is a detail transverse section on the line 6—6 of Fig. 4. Fig. 7 is a detail perspective view of the carriage returning nut, detached.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

In the drawing there is shown a portion of an Edison phonograph including a frame A, and a main shaft B, the latter carrying the record supporting cylinder C and being threaded for the reception of the half-nut of

the sound box carriage D, all of these parts being of the usual construction.

Secured to the main frame at a point in front of the shaft B is a plate 10 having upwardly bent ends forming brackets 11 for the reception of a pair of pivot screws 12, which serve as supports for a return screw shaft 13, this shaft having a quick pitch auger-like thread, and being provided at one end with a gear wheel 14, which is in constant mesh with a gear wheel 15 carried by the main shaft B, and this latter gear may for convenience be connected in any suitable manner to the power transmitting pulley E of the main shaft.

Mounted on the plate 10 is a slidable plate 17, having at one end an upwardly bent arm 18 that is provided with an approximately semicircular recess for the reception of a grooved collar 19 that is loosely mounted on the screw 13, and projecting inward from the bore of the collar is a pair of pins 20 that fit the threads of the shaft 13 in such manner that the collar will be rotated with the shaft while at the same time longitudinal movement of the plate 17 will be readily accomplished for the purpose of moving said collar in the direction of the length of the screw.

The plate 17 has an elongated slot 22 for the passage of a pair of screws 23, that fit in threaded openings tapped in the main frame, and between the heads of the screws and the upper face of the plate are washers 24 which will exercise sufficient friction on the plate 17 to hold the latter in any position to which it may be adjusted.

On the plate 10 is pivoted a small handled lever 25, that is connected to the plate 17 by a link 26, and this lever has a downwardly projecting boss 27 that is arranged to enter a series of notches or depressions 28 formed in the main plate 10, these notches or depressions being disposed in an arcuate row struck from the center of movement of the lever 25, and when the boss engages with these notches or depressions, the lever will be firmly held, and movement of the plate 17 prevented.

On the half-nut carrying arm of the sound box carriage is secured an arm 30 that projects over and forward of the main shaft, and to the front end of this arm is pivoted a nut 31, having a tooth-like projection 32 that is arranged to engage with one side of the thread of the screw 13, while the main portion of the lower face of the nut is slightly

rounded in order that it may ride freely on top of the thread. To the rear face of this nut is secured a pendent tongue 33, that engages with the rear of the screw 13, while the nut is in operative position, and prevents the nut moving forward over the screw to inoperative position, and said tongue will serve further as a means for automatically disengaging the nut from the screw in case the latter reaches the end of the thread.

One side of the nut is cut away to form an inclined shoulder 34, that is arranged to be engaged by a pin 35 projecting from the face of the collar 19, this pin serving to lift the nut up into engagement with the screw, the movement being from the dotted line position to the full line position of Fig. 6.

At that end of the plate 10 nearest the gear 14 is a standard 37 on which is pivoted a nut disengaging arm 38, which may be turned to any position over the screw 13 and locked in place by a nut 39. The function of this arm is to engage the nut and move the latter to inoperative position by the time the recording stylus has reached a position over the starting point of the record, and this arm may be readily adjusted and locked in place in accordance with the position of the record on the cylinder.

In operation, the screw 13 is constantly rotated, so long as the main shaft B is operated, and during a reproducing operation, the nut 31 hangs in a position immediately to the rear of the screw 13, this position being best indicated by the dotted line in Fig. 6. When the reproduction is completed, the pin 35 will engage the shoulder 34 of nut 31, and will lift the latter from the dotted line position to the full line position of Fig. 6, so that the tooth 32 of the nut will engage the thread of the screw 13, while the tongue 33 will engage against the rear face of the screw and will prevent the nut from moving forward to inoperative position. This movement will, also, be transmitted to the sound box carriage through the arm 30, so that the reproducing stylus will be raised from the record. The screw 13 will then rapidly move the nut and sound box carriage toward the starting point, and when the movement is completed, the nut will engage the arm 38 and will be deflected rearward to a position out of engagement with the screw, allowing the sound box carriage to descend, placing the reproducing stylus in contact with the record cylinder. As the records are not always of the same length, and start and end at different points from the ends of the record cylinder, the arm 38 may be adjusted to effect disengagement of the nut at the starting point of the record, while the collar 19 may be quickly adjusted in order to raise the carriage and start the return movement immediately after the completion of the record.

Should the arm 38 be moved out of oper-

ative position, the depending tongue 33 of the latter will by engagement with the unthreaded portion of the screw 13 move said nut rearward to inoperative position and prevent breakage or disarrangement of the parts.

I claim:—

1. A phonograph repeating attachment comprising a screw rotatable continuously while the phonograph is in operation, a nut carried by the sound box carriage, means carried by the screw for elevating the nut into engagement with the thread of said screw and at the same time raising the sound box for engagement with the record, means for adjusting the screw-carried means with relation to the length of the record, and means for determining the different positions of adjustment of the screw-carried means and for stopping the adjusting means in such different positions of adjustment.

2. A phonograph repeating attachment comprising a screw capable of continuous rotation during the operation of the phonograph, means carried by the screw for connecting the sound box carriers thereto and at the same time disconnecting the sound box carrier from engagement with the record, and means for adjusting the elevating means for the sound box carriage longitudinally on the screw, said means being supported independently of the screw.

3. In a repeating attachment for phonographs, a screw connected to the phonograph, drive mechanism for continuous rotation while the phonograph is in operation, a sound box carriage, a nut carried thereby and disengaged from the screw while the sound box is in reproducing relation to the record, a collar on the screw rotatable about the longitudinal axis thereof, means in engagement with said collar for adjusting the latter longitudinally on the screw and for holding the same in the adjusted positions, and means on said collar for engaging and raising the nut into engagement with the screw and at the same time elevating the sound box out of operation with the record.

4. In a repeating attachment for phonographs, a continuously revoluble screw, a sound box carriage, a nut carried thereby and disengaged from the screw during the reproducing operation, a grooved collar centrally bored for the free passage of the screw, pins projecting inward from the collar for engagement with the thread of the screw, an adjustable plate having an upwardly bent end portion recessed to receive the grooved collar and through which said collar may be adjusted in the direction of the length of the screw, and a pin projecting from the screw and arranged to engage and elevate the nut at the end of each reproducing operation.

5. A repeating attachment for phonographs comprising a screw capable of continuous rotation by the actuating mechanism of

the phonograph, a collar mounted on said screw and in continuous engagement therewith for rotation by said screw, said collar having means for moving the sound box out of active relation to the record, and means in constant engagement with said collar for moving the latter longitudinally upon the screw and for locking it in adjusted positions.

6. In a repeating attachment for phonographs, a base plate having end standards, a screw shaft mounted between said standards, gearing connections between the screw shaft and the main shaft of the machine, a slotted plate adjustable endwise of the base plate, guiding screws extending through said slot, an adjusting lever connected to the slotted plate and having a projecting boss, the base plate being provided with an arcuate row of notches or depressions to receive said boss, a bracket arranged at the end of the slotted

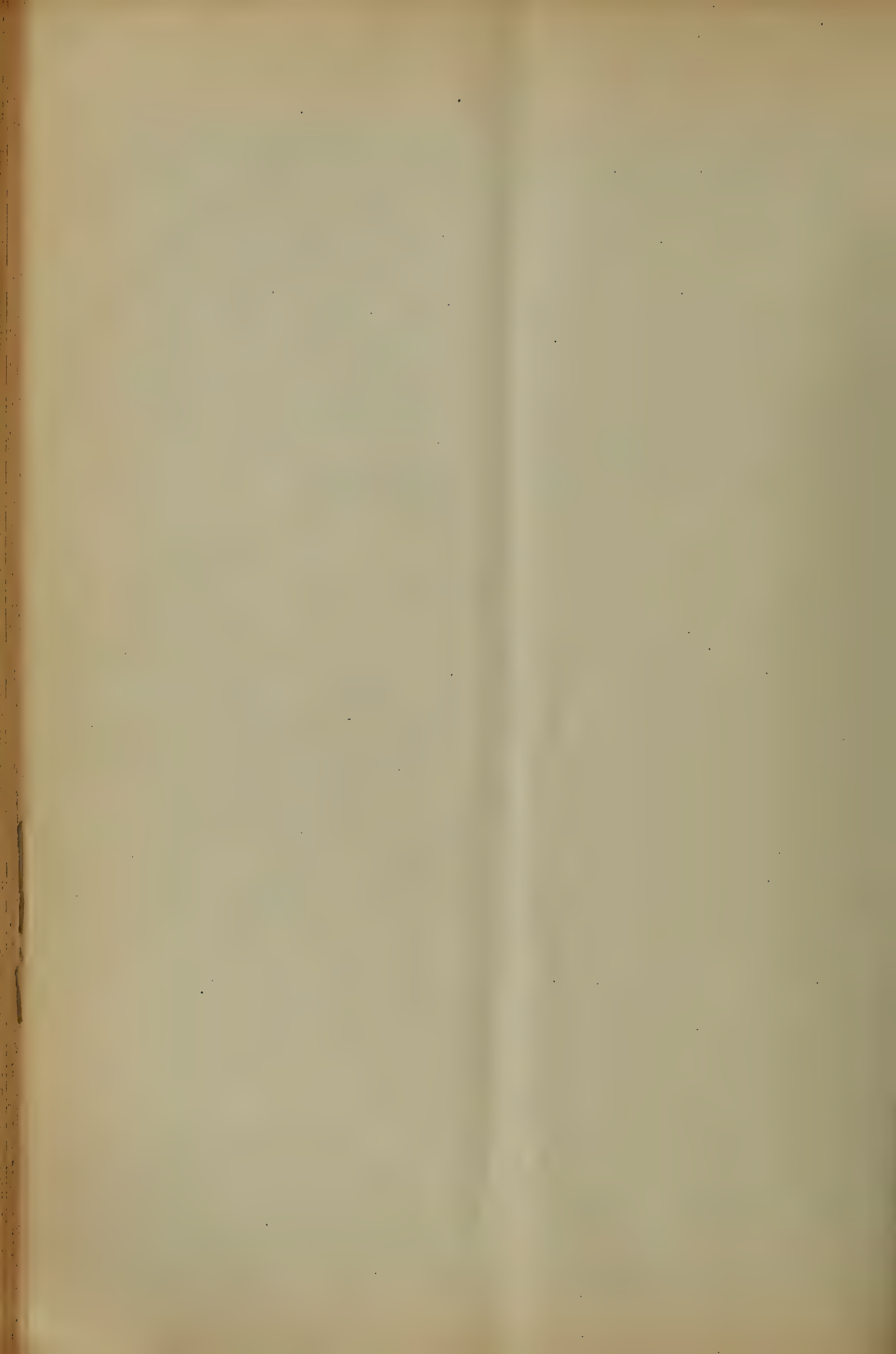
plate and provided with an approximately semi-circular recess, a grooved collar fitting within said recess and surrounding the screw, a pair of pins projecting inward from the collar and engaging the thread of the screw, a pin projecting from said collar, a sound box carriage, an arm projecting therefrom, a nut pivoted to the arm, and having a toothed portion for engagement with the thread, said nut having an inclined shoulder movable into the path of movement of the collar pin, and a tongue depending from the rear face of the nut and arranged to engage the rear face of the screw.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JAMES H. STINSON.

Witnesses:

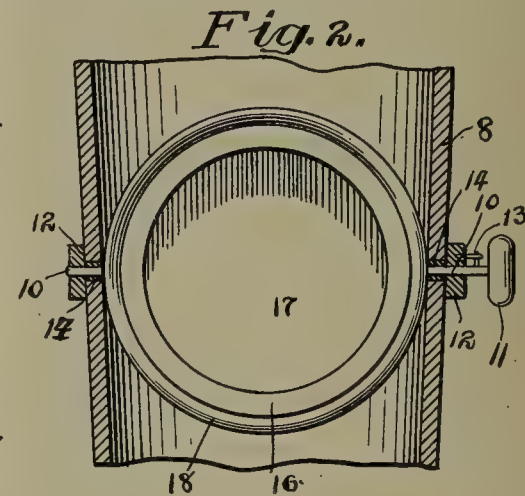
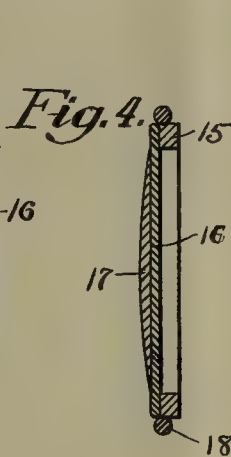
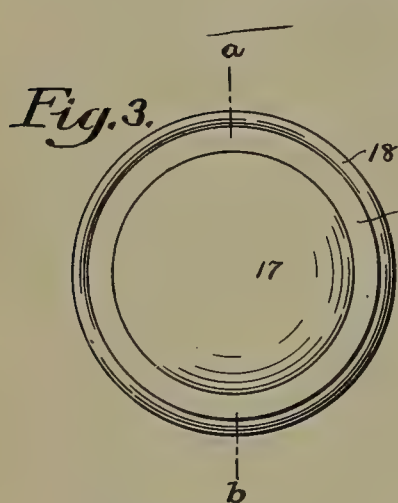
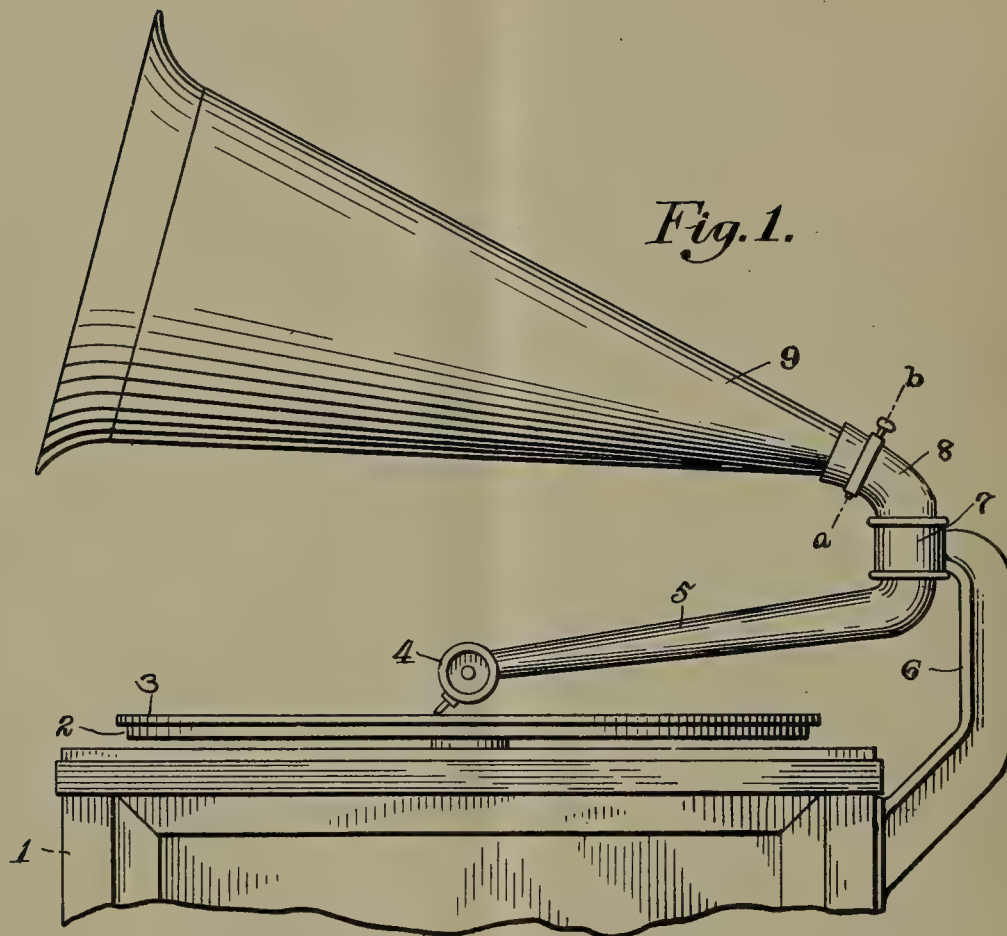
JAS. M. WALKER,
JNO. E. PARKER.



L. T. HAILE.
SOUND REPRODUCING MACHINE.

APPLICATION FILED NOV. 11, 1907.

2 SHEETS—SHEET 1.



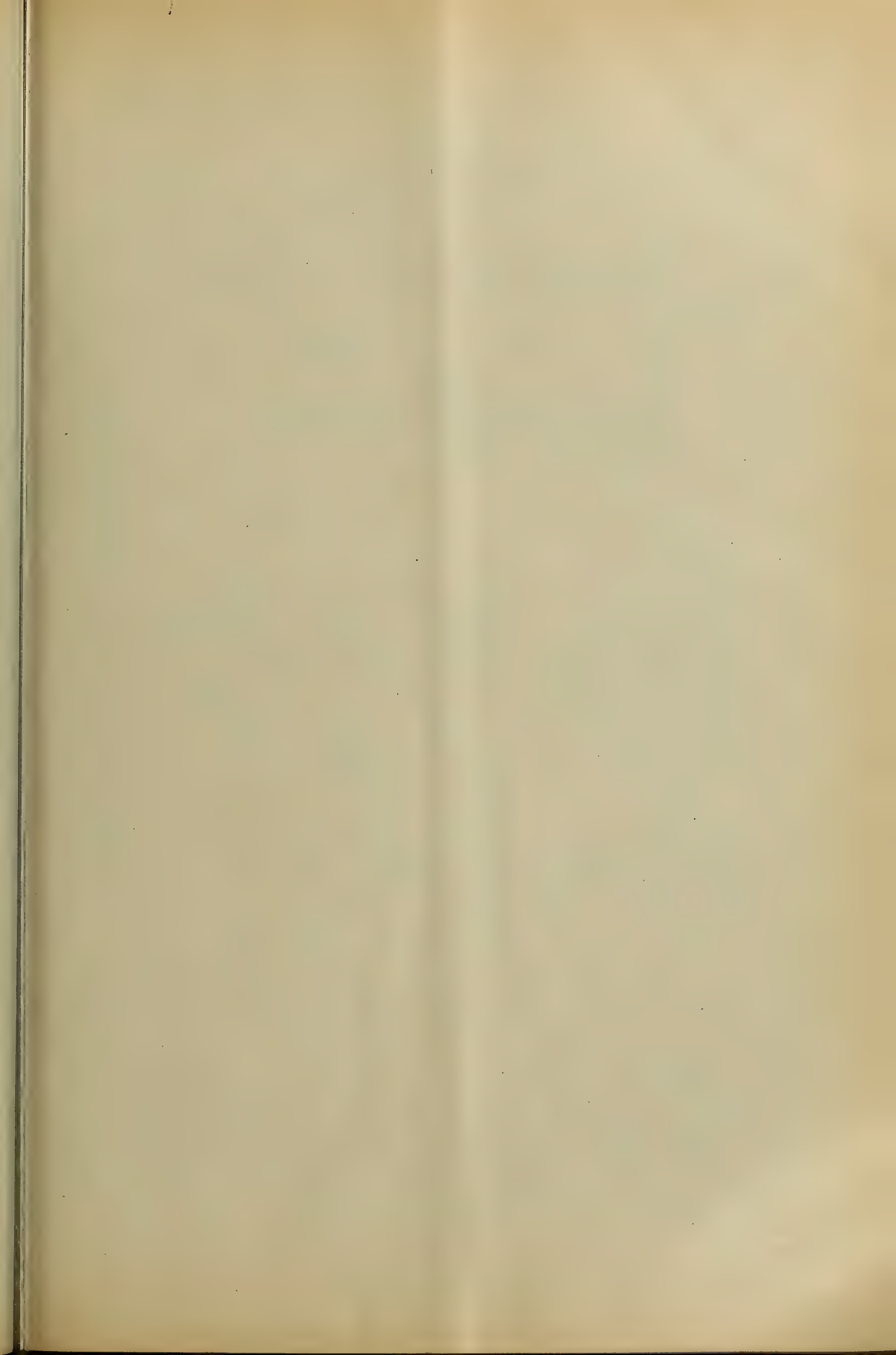
WITNESSES:

A. M. Kiddle
W. J. Gamble

INVENTOR

Luther T. Haile
BY *K. V. Henton*

ATTORNEY.



L. T. HAILE.
SOUND REPRODUCING MACHINE.

APPLICATION FILED NOV. 11, 1907.

2 SHEETS—SHEET 2.

Fig. 5.

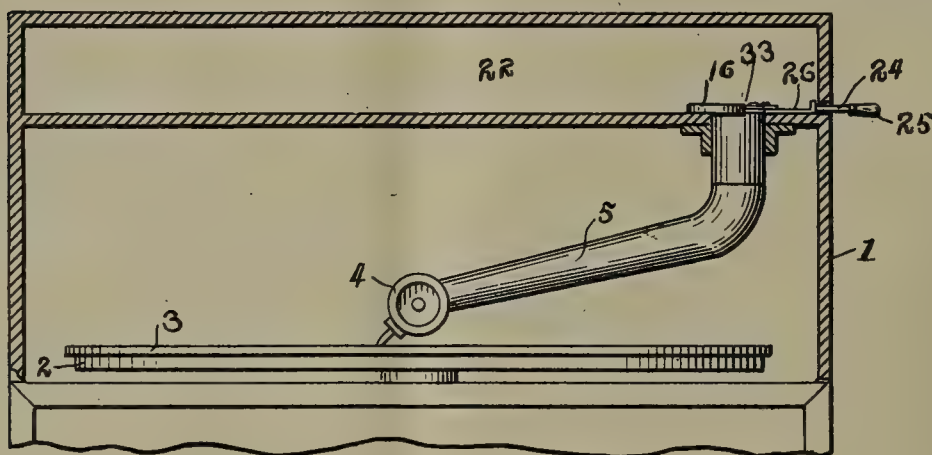


Fig. 7.

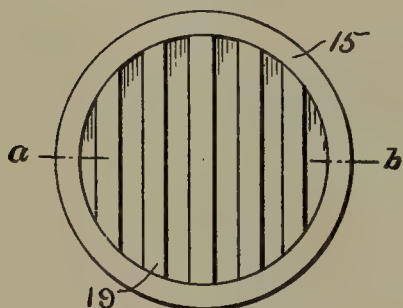


Fig. 8.

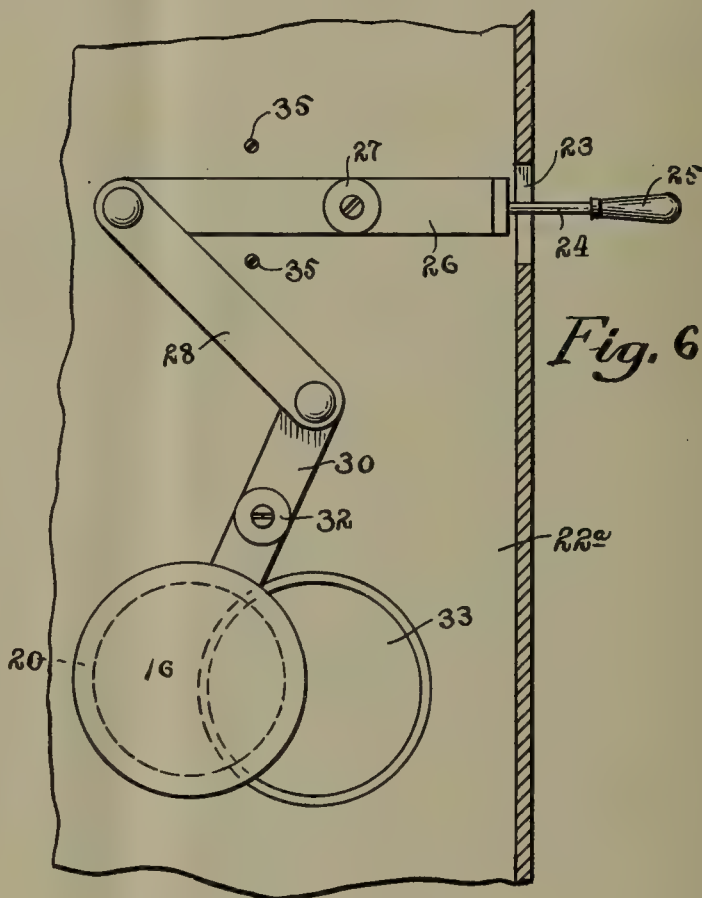
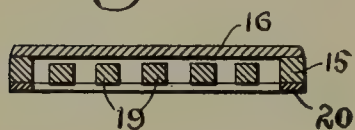


Fig. 6.

WITNESSES:

O. M. Kiddler
H. Gamble

INVENTOR

Luther T. Haile
BY *J. S. Hutton*
ATTORNEY.

UNITED STATES PATENT OFFICE.

LUTHER T. HAILE, OF PHILADELPHIA, PENNSYLVANIA.

SOUND-REPRODUCING MACHINE.

No. 888,084.

Specification of Letters Patent.

Patented May 19, 1908.

Application filed November 11, 1907. Serial No. 401,565.

To all whom it may concern:

Be it known that I, LUTHER T. HAILE, a citizen of the United States, residing in the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Sound - Reproducing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to sound-reproducing machines of any of the known types, employing either a cylinder or a disk record with tubular means to convey sound-waves from the reproducer to a horn or other sound-discharging means; and my invented device, applicable to such machines has for its object to modulate the tone of the sounds so produced, from soft to loud or vice versa, producing diminuendo or crescendo at will, and while the instrument is playing if desired, and at same time to modify the quality—in respect of tone and timbre—of such sounds by causing all or a part of such sound-waves, in motion through the conduit therefor, to be acted upon by a vibratable diaphragmatic valve, thus producing a clearer tone and with better definition, and also preserving the quality of the softer tones which, in sound-reproducing machines as commonly constructed, usually differ in timbre from louder ones, especially when sound-amplifying means are employed with the machine.

To these ends my invention consists in the combination with a conduit through which sound-waves are conducted and discharged from a reproducer, in a sound-reproducing machine, of a vibratable diaphragmatic valve interposed in the path of movement of such sound-waves; with actuating means to cause such valve to wholly or partly close the said sound-conduit and cause the sound-waves, discharged through the same from the reproducer, to be acted upon by the vibratable diaphragm of the valve; also in detail features of construction of the valve and its adjunctive parts, as hereinafter set forth.

In the accompanying drawings illustrating my invention;—Figure 1 is a sectional elevation of enough of one type of talking machine as is necessary to illustrate my invention. Fig. 2 is a section on the line *a—b* of Fig. 1. Fig. 3 is a plan view of the valve detached, and Fig. 4 a section of the same on the line *a—b* of Fig. 3. Fig. 5 is a sectional elevation

of another form or type of sound-reproducing machine, showing the application of my invention thereto. Fig. 6 is a plan view of a detached part thereof. Fig. 7 an underside plan view of a specific form of the valve, and Fig. 8 a section thereof on the line *a—b* of Fig. 7.

Referring now to said drawings in Fig. 1 thereof, 1 indicates the cabinet of a talking machine, 2 the turn-table, 3 the disk record thereon, 4 the reproducing diaphragm and stylus, 5 and 8 the two sections of the tubular sound-conveying arm, as commonly constructed, the sections being operatively united by the journal bearing 7 supported by the bracket 6, in order that the lower section 5 may have a pivotal swing while the upper section 8 is fixed. In the open end of this upper section 8 the small end of the megaphone horn 9 is removably mounted, sleeve-like. At a point about midway in the length of the fixed section 8 of the sound-conveying arm or conduit is mounted my diaphragmatic valve hereinafter described, it being supported and actuated therein by the provision of peripherally-mounted spindles 10, 10, one of which is actuated by a knob 11. The spindles, where they pass through the wall of the section 8 of the sound-conduit are bushed by a sleeve 14 of felting or other sound-insulation to prevent rattling, and I prefer to add a washer device 12 for a like purpose.

The valve is constructed of a flat annular ring 15, on which is mounted a disk-like vibratable diaphragm 16; and outside the periphery of the rim or ring 15 I prefer to mount a rubber ring to make a more or less tight joint between it and the wall of the tubular sound-conduit. In Figs. 2 to 4 of the drawings, I have shown a special form and character of this valvular vibratable diaphragm, made of wood, and in two sections 16 and 17 the latter resting on and cemented to the former, and arranged relatively to each other that the wood fibers of the two will run in transverse directions as indicated by the hatched lines in said Fig. 4. It is not essential however to make the diaphragm 16 of wood, nor to make it double by applying a superposed diaphragm 17. It may be made single as shown in Fig. 8, Sheet 2, in which 15 represents the annular supporting ring or rim of the valve, and 16 the vibratable diaphragm. In such construction I prefer to mount within the ring 15, below and without touching

the under-face of the diaphragm 16, a series of cross pieces, 19, forming a sort of grid—see Figs. 7 and 8.

In Fig. 5 I have shown my vibratable diaphragmatic valve as applied to a form of machine invented by me and described and claimed in an application heretofore filed by me, Serial No. 375,766, in which the sound-conveying conduit 5 discharges the sound-waves from the reproducer into a resonance-chamber indicated at 22 through an aperture 33 in the lower wall 22^a thereof (see Fig. 6) this construction being shown because the valve, instead of being actuated by rotation on its axis, is fixed for horizontal movement in a curved sidewise direction, to wholly or partly cover or uncover the sound-inlet 33 and contiguous discharge end of the sound-conduit 5. To do that properly I supply the actuating mechanism shown in Fig. 6, consisting of a jointed three-armed lever 26, 28 and 30, working on pivots 27 and 32; and stop-screws 35, 35, are provided at suitable places, to so limit the sidewise movement of the valve 16 as to indicate to the operator when it is wholly over or wholly off the aperture 33 and the end of the sound-conduit 5 mounted therein. In such construction of the actuating means for the valve, applied to that type of machine, I prefer to bush the lower face of the valve rim by a damping material, such as felt, indicated at 20 in Figs. 6 and 8, to prevent rattling and to make a more or less close joint between the adjacent face of the valve and the part of which it plays.

It is proper to add that the vibrating valve seems to give the best results when it is not made either too large or too small diametrically, and I have found that two inches external diameter gives excellent results; and this, of course, indicates where it should be located, in the sound-conduit of a talking machine of the types shown in Fig. 1 of the drawings and indeed also in the other type of sound-reproducing machine shown in Fig. 5.

It is a most important function of my device that it may be actuated while the machine is playing, (and hence while the section of the sound-conduit, holding the reproducer, is moving, with the latter, radially over the disk-record, and to that end it is essential, in the form of machine shown in Fig. 1, that it be mounted in that section, 8, of the sound-conduit, which is not movable relatively to the disk-record 3, although obviously, if the function recited of actuating the valve while the machine is playing, is not desired, the vibratable valve may be mounted in the smaller end of the horn itself.

It is also to be noted that when the upper diaphragm 17 in the duplex construction shown in Fig. 4 is employed, it may best be made of graduated thickness; as this insures a stronger construction and better vibration as well as a more even vibration throughout

the entire structure. The diaphragm may also be made of prepared calf skin, such as is used in drum heads; or of mica; or indeed of any material of which fixed vibratable diaphragms are now commonly constructed. Or if desired, in making a duplex structure, as indicated in Fig. 4, a combination of different substances may be employed, such as calfskin for the main diaphragm 16 and of wood for the superposed diaphragm 17; these various combinations of substances, the tone-producing qualities of which are well known, may be thus employed, to give a variety of tone quality, as will be obvious to those skilled in the art.

In further statement of the operation of the device it may be said of the form of valvular diaphragm shown in Fig. 8 that the sound-waves, are deflected by the grid strips 19 against the under face of the diaphragm and cause a greater number of sound-waves to act thereon than would otherwise be the case, when the valve is partly open in the sound-conduit, and insures practically an even quality of tone regardless of the position, for the time being, of the valve in the conduit; my experience with it being that this added feature of construction gives a clearer and more musical tone and with much better definition.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In combination with the sound - discharge passage of a sound-reproducing machine, a vibratable diaphragmatic valve of approximately equal diameter mounted therein, with means to actuate it to adjustably control the area of such passage, said valve consisting essentially of an annular rim, with a diaphragm mounted thereon composed of two layers of vibratable material such as prepared skin cemented to each other, adapted to be sympathetically vibrated by sound-waves discharged against it from the reproducer.

2. In combination with the sound - discharge passage of a sound-reproducing machine, a vibratable diaphragmatic valve, which is movably adjustable to control the area of such passage, said valve consisting essentially of an annular rim, a vibratable diaphragm of fibrous wood, mounted on said rim, and a second diaphragm of like character arranged with its fibers transversely to those of the first mentioned diaphragm and cemented to and over the face of the latter.

3. In combination with the sound - discharge passage of a sound-reproducing machine, a vibratable diaphragmatic valve, which is movably adjustable to control the area of such passage, said valve consisting essentially of an annular rim, a series of bars forming a grid mounted diametrically within said rim, a vibratable diaphragm, mounted on

said rim, and a second diaphragm cemented to and over the face of the first diaphragm.

4. In combination with the sound-dis-
 5 charge passage of a sound-reproducing ma-
 chine, a vibratable diaphragmatic valve,
 which is movably adjustable to control the
 area of such passage, said valve consisting
 essentially of an annular rim, a vibratable
 diaphragm of approximately equal diameter
 10 mounted thereon, and a series of bars forming
 a grid mounted diametrically within said an-
 nular rim of the valve.

5. In a sound-reproducing machine the
 combination with a sound-chamber into
 15 which sound-waves are discharged from a
 tone-arm carrying a reproducer, of a valvu-
 lar diaphragm governing the inlet to said
 chamber and composed of a supporting rim
 with a vibratable diaphragm mounted there-
 20 on, and means to actuate it in a curved side-
 wise direction, consisting of a pivotally-con-
 nected three-armed lever, pivot pins connect-

ing and operatively supporting said levers,
 and stop devices adapted to limit the side-
 wise movement thereof.

25

6. In combination with the sound-dis-
 charge tubular conduit of a talking machine
 and with a communicating sound-passage-
 way arranged transversely thereto, of a
 vibratable diaphragmatic valve interposed 30
 between such conduit and passageway, said
 valve consisting of an annular rim, a resilient
 ring on the periphery thereof, a vibratable
 diaphragm mounted on said rim, a damping
 material such as felt on the lower face of said 35
 annular rim, and means to actuate said valve.

In testimony whereof, I have hereunto
 affixed my signature this ninth day of No-
 vember A. D. 1907.

LUTHER T. HAILE.

Witnesses:

A. M. BIDDLE,
 JOSEPH W. SHANNON.

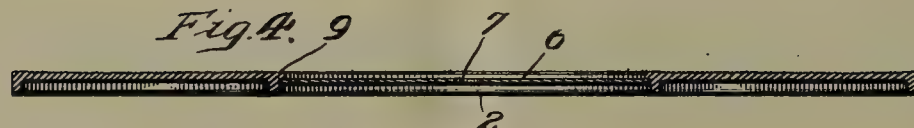
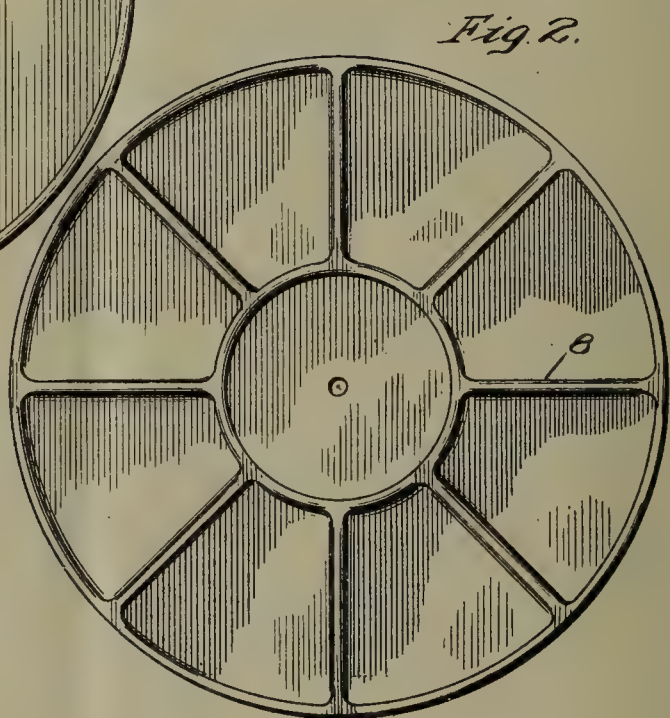
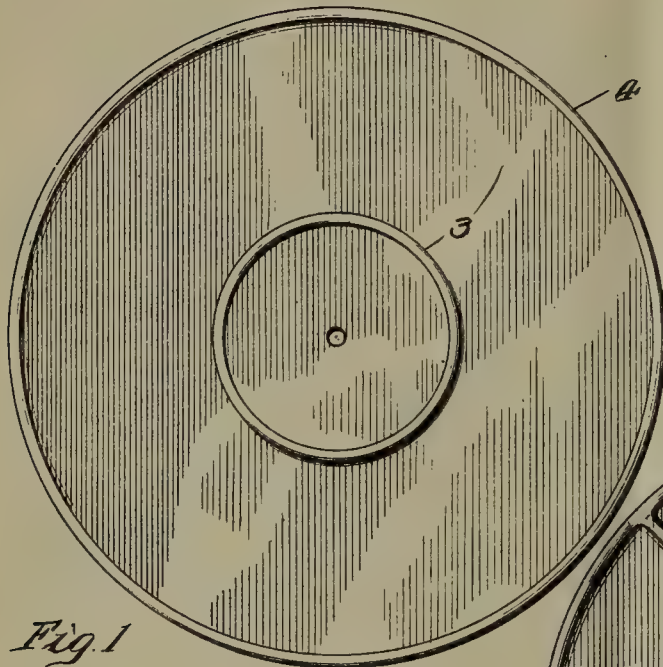
No. 888,089.

PATENTED MAY 19, 1908.

E. R. JOHNSON.

RECORD FOR TALKING MACHINES.

APPLICATION FILED AUG. 30, 1904. RENEWED OCT. 12, 1907.



WITNESSES:
F. J. Hartman
Edw. W. Vaill Jr.

INVENTOR
Eldridge R. Johnson
BY *Home Peltz*
ATTORNEY.

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF MERION, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

RECORD FOR TALKING-MACHINES.

No. 888,089.

Specification of Letters Patent. -

Patented May 19, 1908.

Application filed August 30, 1904, Serial No. 222,687. Renewed October 12, 1907. Serial No. 397,168.

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of Merion, county of Montgomery, State of Pennsylvania, have invented certain new and useful Improvements in Records for Talking-Machines, of which the following is a full, clear, and complete disclosure of different forms thereof.

Heretofore in the manufacture of flat disk records for talking machines it has been the practice to stamp out the record disks from a suitable material by means of a die containing a matrix upon the surface of which has been engraved or otherwise placed the record grooves, which grooves in connection with the sound box are adapted to reproduce the sounds impressed upon the original record. The record disks formed by so impressing the matrices have usually been of some hard, durable material which softens under the influence of heat, but which is hard and firm under normal conditions of temperature. The material usually employed for making these records has been in the form of flat sheets and have been of uniform thickness throughout the entire extent of the disk with the possible exception of the central portion where the label has been impressed or countersunk into the material during the pressing or forming of the record. This material, in many instances has been a substance called "duranoid" which consists of shellac and certain other coloring pigments and strengthening ingredients. Other similar materials which have been used are hard rubber and celluloid. It will be realized that these compositions are expensive when used in large quantities, especially in view of the fact that talking machine records now employed in this art have been steadily increasing in size.

One object, therefore, of my invention is to produce a record which may have all the advantages of a flat disk record of uniform thickness but which will at the same time be much lighter and, therefore, less expensive in original cost and also will be easier to handle and less expensive in transportation either by mail, freight or express.

A further object of my invention is to provide a record disk which will be easily and accurately centered upon the talking machine turntable without the employment of unnecessary material at the center of the record

where the radius is too small for the efficient recording of the sound waves.

A further object of my invention is the production of a record which will have strengthening means of such form as to give a stiff and firm backing for the reproducing surface in connection with the central opening without the necessity of employing the amount of material required in a disk record having a smooth under surface.

Briefly, my invention comprises a disk record having the center which is free from the grooves containing the sound waves cut away or omitted forming an annular plate or surface in the opening of which a card, label or centering plate may be carried for the purpose of fixing the record upon the turntable in the usual manner.

For a full, clear and exact description of these forms of my invention reference may be had to the following specification and to the accompanying drawing forming a part thereof in which

Figure 1 is a reverse plan view of a talking machine record having concentric strengthening ribs on its under surface and having the center of said record provided with a centering plate made in accordance with my invention; Fig. 2, a similar view of a record having both concentric and radial strengthening ribs; and Figs. 3 and 4 are transverse sectional views of the records shown in Figs. 1 and 2, and indicating two ways of attaching the designating label which also serves in these instances as centering means.

Referring to the drawings, the numeral 1 indicates a flat, annular piece of duranoid or other material used in the manufacture of records having a central opening 2 therein and being provided upon the edge of said opening and upon the outer edge by strengthening flanges 3 and 4. The inner edge or surface of the annular plate is provided with a lower flange 5 upon which a disk 6 of metal, pasteboard or similar stiff material is adapted to rest, said disk being held in position within the said opening upon said flange in any suitable manner such as by cementing or being impressed therein during the forming of the record. The center of the disk 6 is provided with an opening 7 which is adapted to receive the central stud or shaft of the turntable spindle in the usual manner.

In Fig. 2, I have shown in addition, to

the concentric strengthening ribs, radial strengthening ribs 7 which give the required stiffness to the record out to its extreme edge. Different forms and arrangements of these 5 strengthening ribs have been described and claimed in a separate application filed herewith Ser. No. 222,685, dated August 30, 1904.

In Fig. 4, I have shown a construction similar to that shown in Fig. 3 except that 10 the centering disk or label rests upon a flange 9 which is at the upper portion of the opening 3, the centering disk or label 6 being forced against the same from the under side of the record and being retained thereon in the 15 manner above referred to.

Having thus described these forms of my invention, what I claim and desire to protect by Letters Patent, is:—

1. In a record for talking machines, the 20 combination of a thin annular record portion, having an internal and an external flange, and radial ribs extending between said flanges; of a centering disk, engaging the inner flange of said annular portion and 25 permanently secured thereto.

2. In a record for talking machines, the combination of a thin annular record portion, having an internal and an external

flange and radial ribs extending between said flanges, with a printed label engaging the 30 inner flange of said annular portion and permanently secured thereto.

3. In a record for talking machines, a combination of a thin annular record portion having an internal and external flange, should- 35 ders or seats on the inner edges of said flange, and strengthening ribs extending between said flanges; with a centering disk, permanently secured to said shoulders or seat.

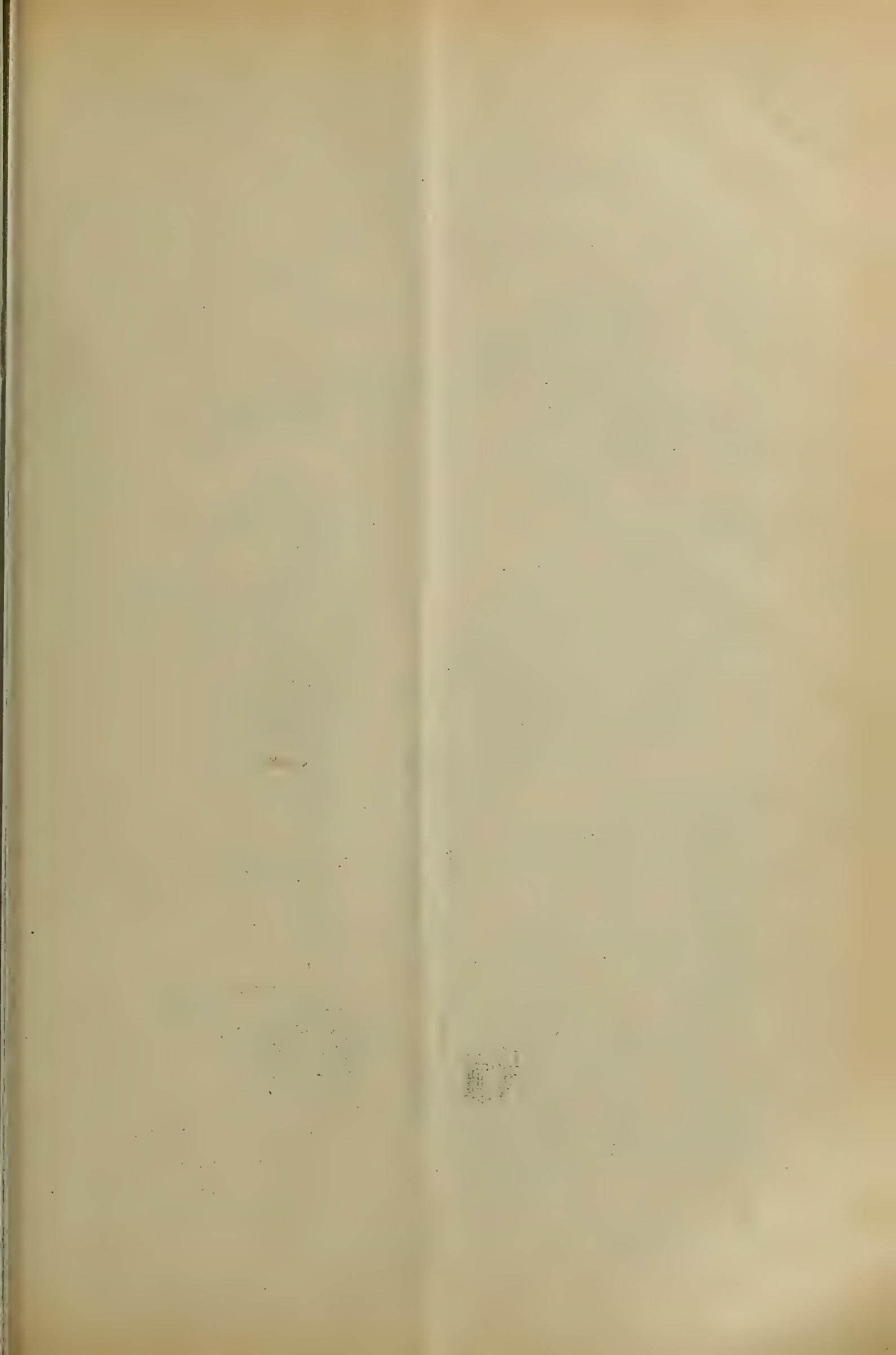
4. A record for talking machines comprising 40 a substantially flat disk having a central opening therein occupying the space not taken up by the record grooves, a flange upon the inner surface of said opening and a plate of thin durable material retained in position 45 upon said flange having a hole therein for centering the record upon the turntable, said plate also being adapted to receive printed matter in the form of a label or otherwise.

In witness whereof, I have hereunto set my 50 hand this 29th day of August, 1904.

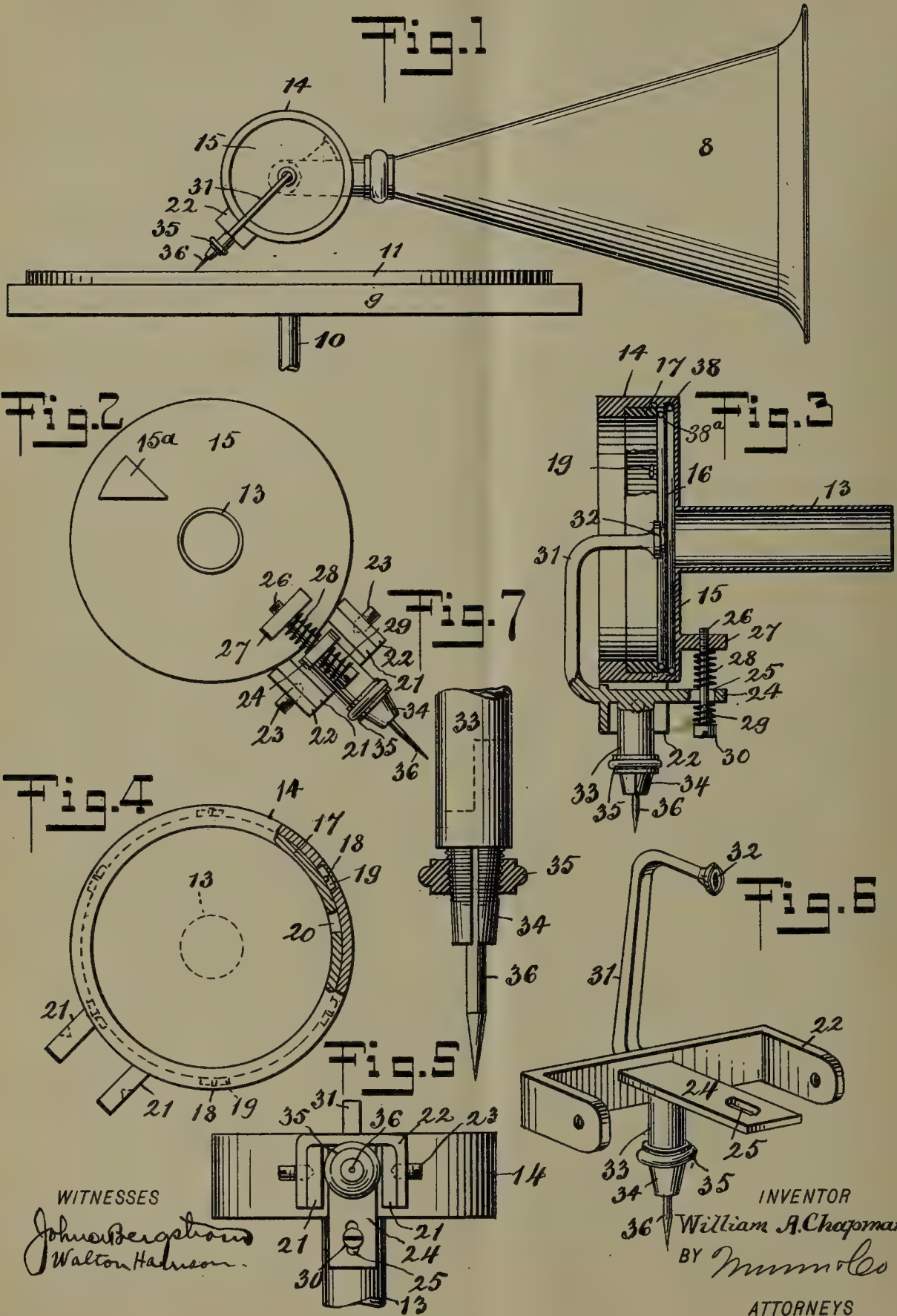
ELDRIDGE R. JOHNSON.

Witnesses:

WILLIAM F. BRENNAN,
EDW. W. VAILL, Jr.



W. A. CHAPMAN.
ATTACHMENT FOR TALKING MACHINES.
APPLICATION FILED AUG. 5, 1907.



WITNESSES

John Bergstrom
Walton Hanson

INVENTOR

William A. Chapman

BY *Mumford*

ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM ALBERT CHAPMAN, OF SMITHVILLE, ARKANSAS.

ATTACHMENT FOR TALKING-MACHINES.

No. 888,306.

Specification of Letters Patent.

Patented May 19, 1908.

Application filed August 5, 1907. Serial No. 387,138.

To all whom it may concern:

Be it known that I, WILLIAM ALBERT CHAPMAN, a citizen of the United States, and a resident of Smithville, in the county of Lawrence and State of Arkansas, have invented a new and Improved Attachment for Talking-Machines, of which the following is a full, clear, and exact description.

My invention relates to talking machines and admits of general use, but is of peculiar value in connection with sound reproducers employed upon disk talking machines.

Among the purposes of my invention are general improvement of the tones, amelioration of the scratching and metallic harshness and the development of delicate sounds difficult of reproduction.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a fragmentary side elevation of a disk talking machine equipped with my invention and ready for use; Fig. 2 is an enlarged rear elevation of the diaphragm box provided with a needle and with connections for enabling the latter to transmit vibrations to the diaphragm; Fig. 3 is a central vertical section through Fig. 2 showing the adjusting screw for controlling the movement of the needle and also showing the means for transmitting vibrations from the needle to the diaphragm; Fig. 4 is a front elevation of the diaphragm box partly broken away; Fig. 5 is an edge view of the diaphragm showing means for adjusting the vibrator which is pivotally mounted upon the diaphragm box; and Fig. 6 is a perspective of the vibrator and its accompanying mechanism for carrying the needle.

A horn is shown at 8 and a turntable at 9, the latter being mounted upon a revoluble stem 10 and supporting a disk tablet 11. A sleeve 13 is connected with the diaphragm box, 14, the latter having the form of a flat receptacle and being provided with a bottom 15. This bottom is provided with a vent passage 15^a.

A diaphragm is shown at 16 and at 17 is shown a spring ring. Mounted upon this spring ring are bosses 18 which project into apertures 19 in the diaphragm box 14. The spring ring 17 is provided with a slot 20 by aid of which it may be contracted so as to enter the diaphragm box. Lugs 21 are

mounted rigidly upon the diaphragm box and disposed parallel with each other. A yoke 22, of substantially U-shape, is journaled upon the lugs 21 by aid of screws 23, the latter being conical-pointed and being adjustable.

A plate 24 is connected with the yoke 22 and is provided with a slot 25. A screw 26 extends through a lug 27 threaded to fit it and mounted upon the bottom 15 of the diaphragm box. Spiral springs 28, 29 encircle the screw 26. This screw has a slotted head 30 to receive the point of a screw driver. An arm 31 is mounted integrally upon the yoke 22 and is provided with a tap 32 which engages the center of the diaphragm 16. A sleeve 33 is mounted rigidly upon the plate 24 and is thus rendered integral with the arm 31. The sleeve 33 carries a chuck 34 made in halves, threaded externally, and encircled by a ring 35, the latter being threaded internally.

A needle is shown at 36 and is inserted within the chuck 34. By turning the ring 35 in one direction the chuck releases its grip upon the needle, whereas by turning the ring 35 in the opposite direction, the needle is gripped tightly.

A rubber gasket or washer 38 is mounted in the sound box. This gasket or washer is round in cross section and from one-eighth to three-sixteenths of an inch in diameter, and is seated in a groove in the wall of the sound box, said groove being preferably of a depth equal to one-third of the diameter of the gasket or washer. Upon this gasket or washer rests the diaphragm 16 and upon said diaphragm rests a second rubber gasket or washer 38^a of the same shape and diameter as the gasket or washer 38, but the gasket or washer 38^a is not let into the wall of the sound box; and upon said second gasket or washer rests the spring ring 17. It will thus be seen that through this arrangement the edge of the diaphragm 16 rests on an inwardly sloping surface or seat formed by the first gasket or washer 38, that the second gasket or washer 38^a bears on the diaphragm 16 inside, this effecting the putting of the diaphragm under a strain or tension, and the spring ring 17 not only holds the system in place, but further exerts a spring pressure on the upper gasket or washer 38^a. This pressure around the rim or near the edge of the diaphragm induces a uniform strain throughout the diaphragm to the increase of its re-

siliency or quickness to respond to any impulse. This I consider a novel and most important feature.

My invention is used as follows: The parts
5 being arranged as above described, the operator adjusts the tension of the arm 31 against the diaphragm 16 and in doing this makes use of the screw 30, as will be understood from Fig. 3. The needle 36 is now brought
10 into engagement with the sound grooves of the disk tablet 11 and the disk is caused to rotate. Vibrations are communicated from the sound record through the needle 36, sleeve 33 and arm 31 to the diaphragm 16
15 and the sounds are thus reproduced.

From the mountings of the arm 31 it will be noted that this arm has a very simple motion which corresponds to the vibration of the diaphragm. It is impossible for the arm
20 31 to have any considerable amount of play and its motion is therefore comparatively true and positive.

In order to remove the diaphragm 16 the diaphragm box 14 is taken from the machine
25 and the spring ring 17 pressed inwardly so as to withdraw the bosses 18 from the apertures 19. The spring ring being taken out, the diaphragm and rubber washers can readily be taken out.

30 It will be noted that the axis of vibration of the arm 31 coincides with the axes of the screws 23, and therefore lies in a plane cross-

ing at a right angle the general longitudinal direction of the needle 36.

Having thus described my invention, I 35 claim as new and desire to secure by Letters Patent:

1. The combination of a diaphragm, an arm for actuating the same, a yoke rigidly connected with said arm, a plate connected 40 with said arm and said yoke, said plate being provided with a slot, a pin extending through said slot, a spring encircling said pin and engaging said plate at a point adjacent to said slot, a mounting for said pin, and mechanism 45 connected with said arm and provided with means for supporting a needle.

2. The combination of a diaphragm, an arm engaging said diaphragm for the purpose of actuating the same, a yoke rigidly 50 connected with said arm, a pivotal support for said yoke, a plate mounted centrally upon said yoke and extending therefrom, a spring engaging said plate, means for adjusting said spring relatively to said plate, and mechan- 55 ism connected with said arm for supporting a needle.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM ALBERT CHAPMAN.

Witnesses:

GEORGE W. BRADY,

S. A. D. JONES.

No. 888,682.

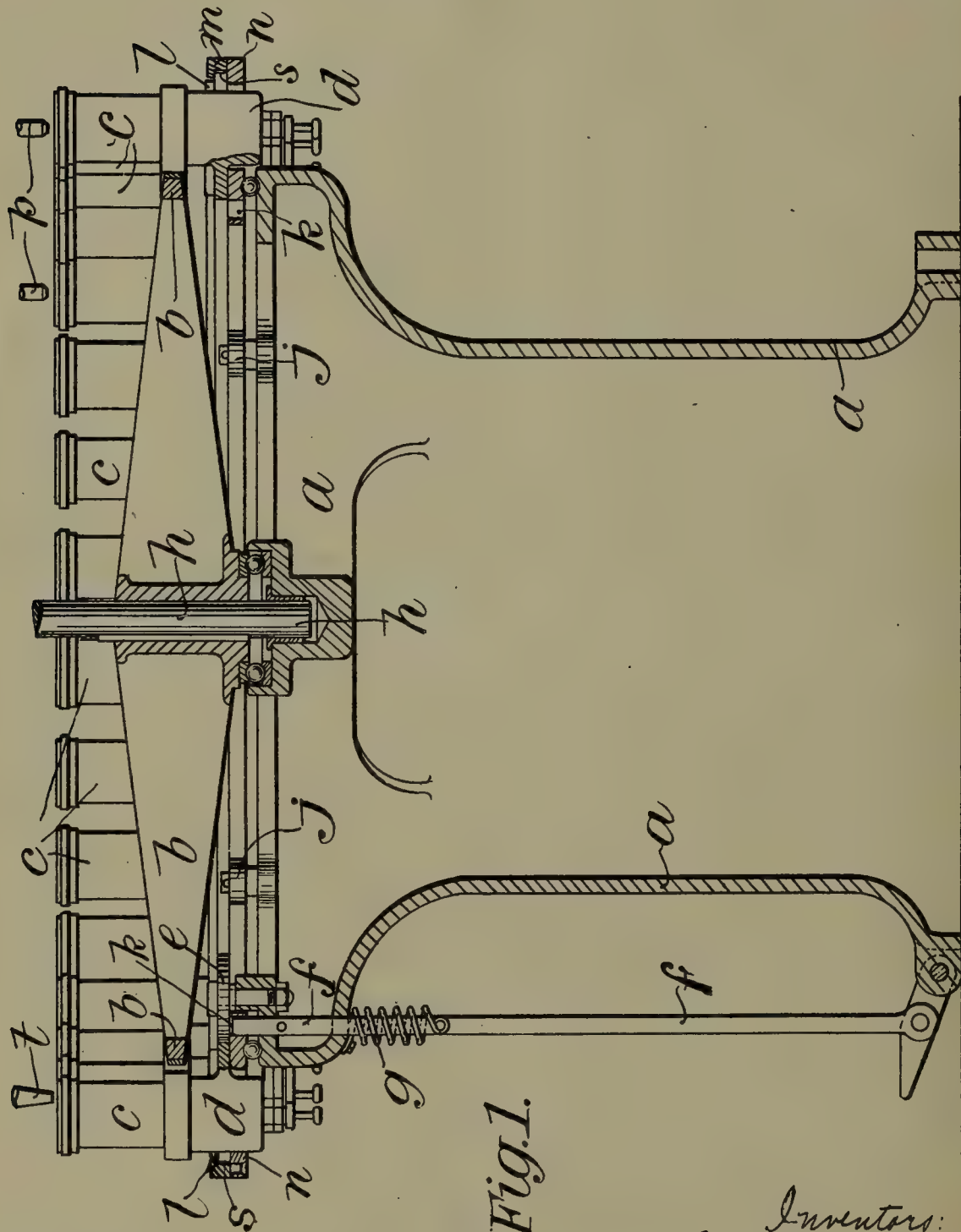
PATENTED MAY 26, 1908.

J. AMES, S. BURGESS & E. TRAYNOR.

APPARATUS FOR MANUFACTURING CYLINDRICAL RECORDS AND BLANKS
FOR PHONOGRAPHS, GRAPHOPHONES, AND THE LIKE.

APPLICATION FILED MAR. 27, 1908.

3 SHEETS—SHEET 1.



Witnesses:

L. E. Backley.

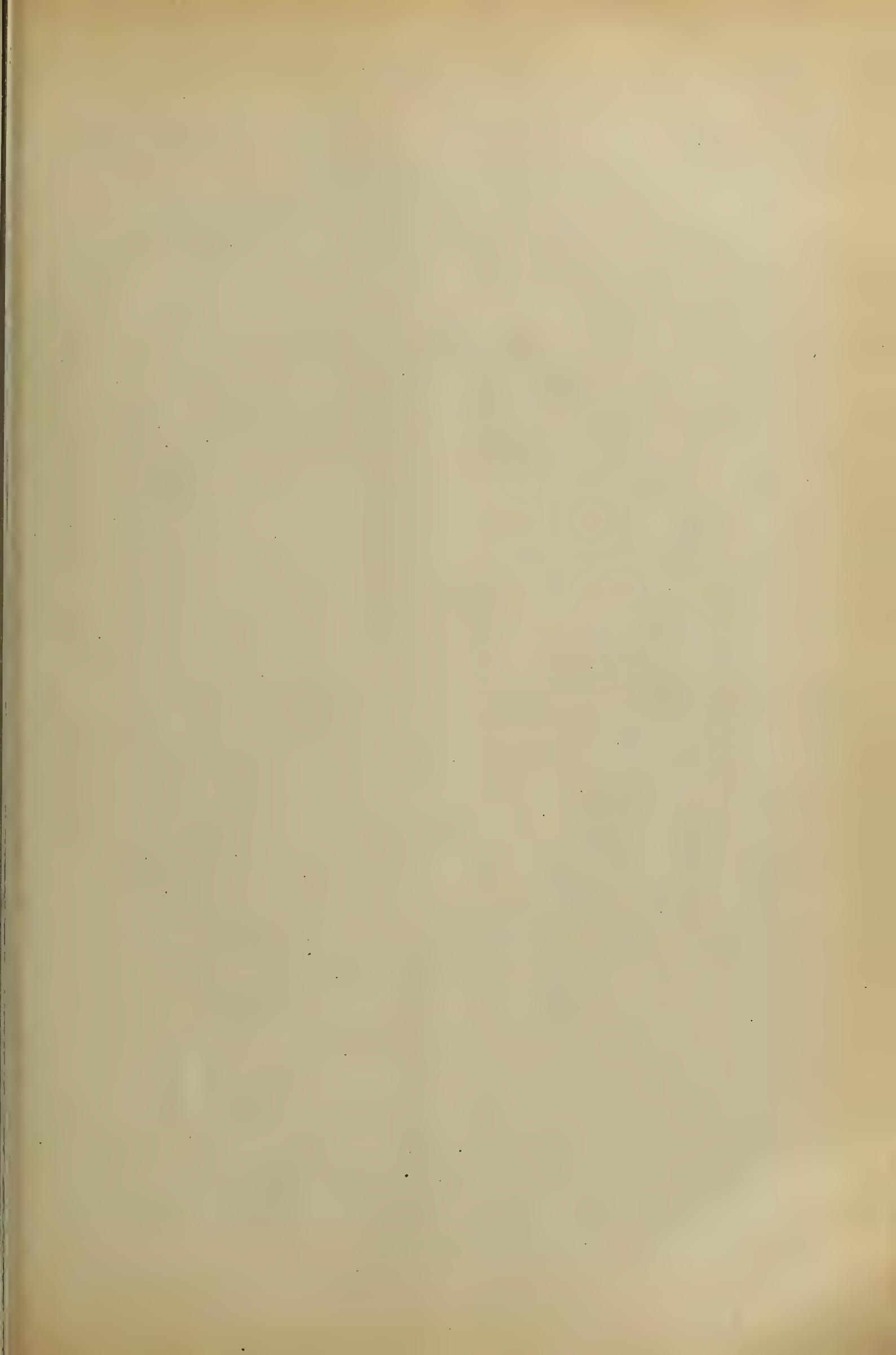
J. Edwin Burch

Fig. 1.

Inventors:

John Ames,
Edward Traynor, Jr.
Stephen Burgess,

by Frank Appleman
att'y.



No. 888,682.

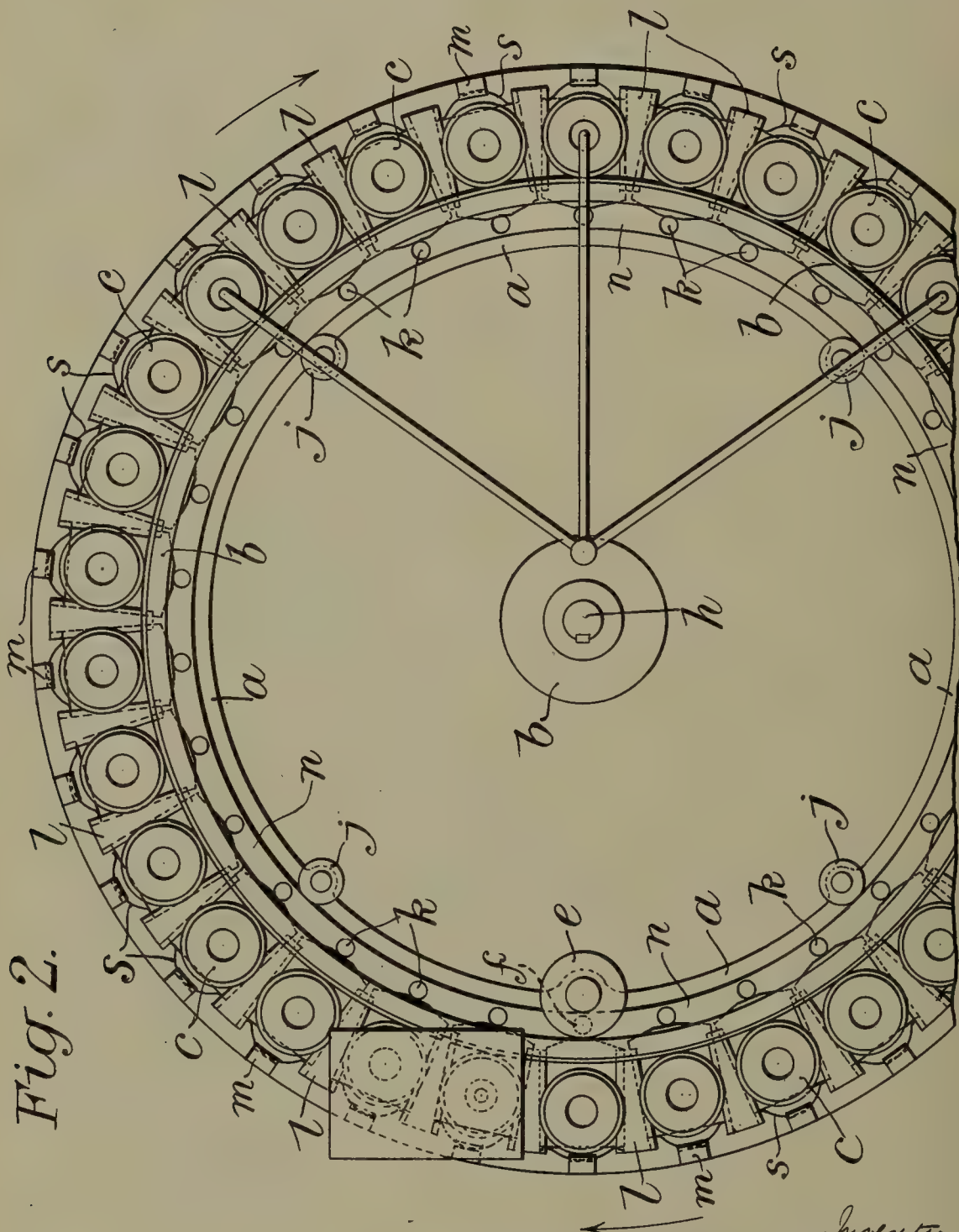
PATENTED MAY 26, 1908.

J. AMES, S. BURGESS & E. TRAYNOR.

APPARATUS FOR MANUFACTURING CYLINDRICAL RECORDS AND BLANKS
FOR PHONOGRAPHS, GRAPHOPHONES, AND THE LIKE.

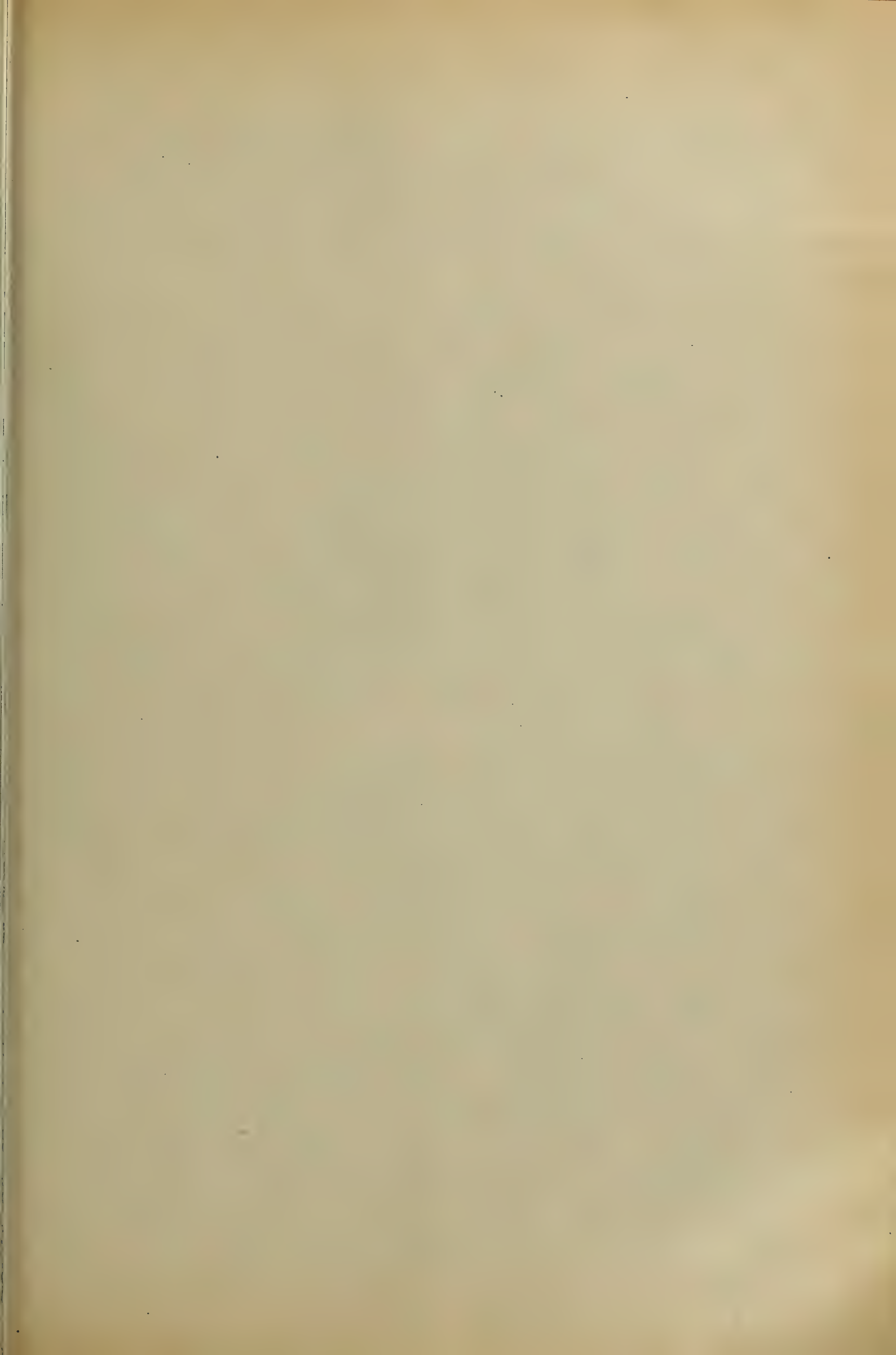
APPLICATION FILED MAR. 27, 1908.

3 SHEETS—SHEET 2.



Witnesses:
L. E. Barkley
J. Edwin Bunch

Inventors:
John Ames, Edward Traynor, and
Stephen Burgess,
by *Frank A. Hanna*
attys.



No. 888,682.

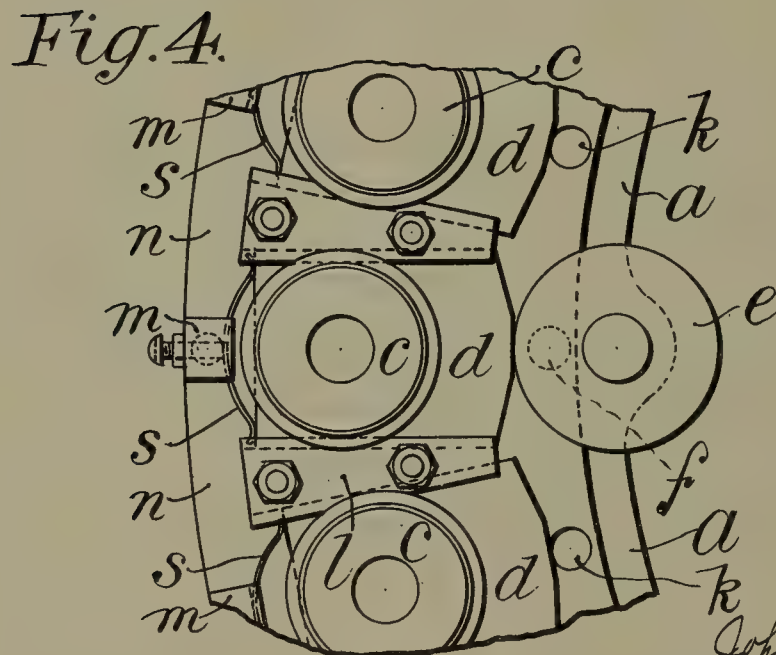
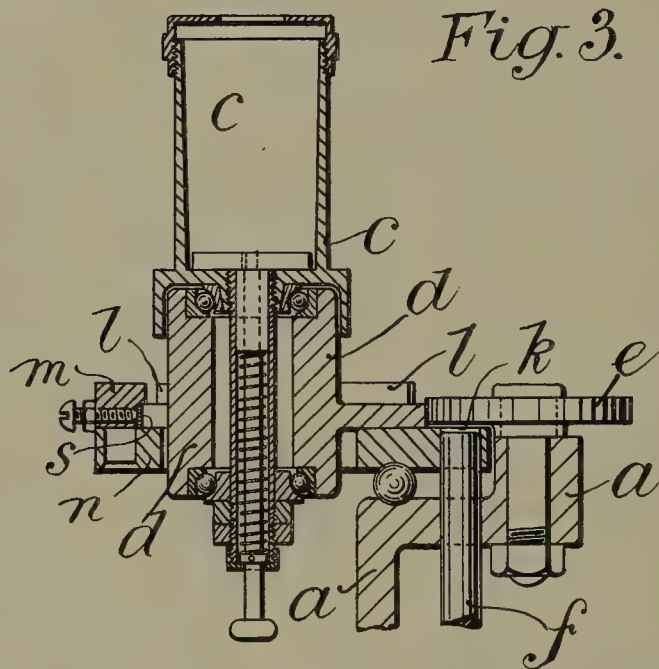
PATENTED MAY 26, 1908.

J. AMES, S. BURGESS & E. TRAYNOR.

APPARATUS FOR MANUFACTURING CYLINDRICAL RECORDS AND BLANKS
FOR PHONOGRAPHS, GRAPHOPHONES, AND THE LIKE.

APPLICATION FILED MAR. 27, 1908.

3 SHEETS—SHEET 3.



Witnesses:
L. E. Backus.
J. Edwin Burch

Inventors:
John Ames,
Edward Traynor, Jr.,
Stephen Burgess,
by *Francis Appelman* atty.

UNITED STATES PATENT OFFICE.

JOHN AMES, OF LONDON, AND STEPHEN BURGESS AND EDWARD TRAYNOR, OF LEYTONSTONE, ENGLAND.

APPARATUS FOR MANUFACTURING CYLINDRICAL RECORDS AND BLANKS FOR PHONOGRAPHS, GRAPHOPHONES, AND THE LIKE.

No. 888,682.

Specification of Letters Patent.

Patented May 26, 1908.

Application filed March 27, 1908. Serial No. 423,695.

To all whom it may concern:

Be it known that we, JOHN AMES, residing at 77 Tredegar road, Bow, London, factory manager, and STEPHEN BURGESS and EDWARD TRAYNOR, both of 89 Melford road, Leytonstone, England, electrochemical engineers, have invented a certain new and useful Apparatus for Manufacturing Cylindrical Records and Blanks for Phonographs, Graphophones, and the Like, of which the following is a specification such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improved devices or machines for revolving rotatable, cylindrical shells or other suitable holders, carrying molds, of the kind in which records or the blanks or cylinders for same for phonographs, graphophones and the like are made by pouring into them molten wax, or any other suitable material of which records or blanks may be made.

An object of this invention is to provide novel means for carrying a series of molds and simultaneously rotating them, novel means being provided for successively moving the molds out of operative relation with the rotating means whereby the molds successively cease rotation in order that the product may be removed.

With the foregoing and other objects in view, the invention consists in the details of construction and in the combination and arrangement of parts to be hereinafter more fully set forth and specifically claimed.

We will now describe our invention with reference to the accompanying drawings in which:—

Figures 1 and 2 show respectively side sectional and plan views of a machine constructed according to our invention, and Figs. 3 and 4 show details connected with the shells.

The table *a* supports the revolving wheel *b* which has frictional contact with the shells *c* and rotates them at a high speed. These shells are mounted on spring controlled supports or blocks *d* arranged in the slides *l* on the revoluble shell carrying frame *n*. An idle wheel *e* is mounted on the table *a* in such a position that it engages one at a time the inner edges of the supports *d*, which are

shown sloped with flat center portion, and pushes the support back against the pressure of the spring *s*, thus removing the shell from contact with the wheel *b* and enabling it to be handled and the record or blank removed. The shell carrying frame *n* has a series of holes *k*, one opposite to each shell into which a spring and foot-controlled rod *f* can enter so as to lock the frame *n* and prevent it turning.

m are blocks holding the springs *s* which can be adjusted by set screws and nuts, or in other convenient manner.

g is the spring on stop rod *f*, and *j*, *j*, are rollers guiding the frame *n*.

The molten wax or equivalent is supplied from any convenient source and fed into the mold through the nozzle *t*. Cold air, water and the like may be supplied through pipes such as *p* into the molds to assist the cooling of the wax.

What we claim and desire to secure by Letters Patent is:—

1. In a phonograph record molding machine, shells for containing molds, a shell carrying frame, slidable supports for the shells, means for rotating the shell carrying frame, means engaging the peripheries of the shells for rotating them and a member stationed in the normal path of travel of portions of the shell supports adapted to engage and actuate the said supports as they are moved into engagement with said member by the rotation of the shell carrying frame.

2. In a phonograph record molding machine, shells for containing molds, a shell carrying frame, slidable supports for the shells, means for rotating the shell carrying frame, means for rotating the shells and a rotary member stationed in the normal path of travel of portions of the shell supports adapted to engage and actuate the said supports as they are moved into engagement with said member by the rotation of the shell carrying frame.

3. In a phonograph record molding machine, shells for containing molds, a frame on which the shells are mounted, slidable supports for the shells, means for rotating the shells, a member stationed in the nor-

mal path of travel of portions of the shell supports adapted to engage and actuate the said supports as they are moved into engagement with said member by the rotation of the shell carrying frame, and means for automatically returning the shell supports when the shell carrying frame moves them out of engagement with said member.

In witness whereof we have hereunto set our hands in presence of two witnesses.

JOHN AMES.

STEPHEN BURGESS.

EDWARD TRAYNOR.

Witnesses:

WALTER J. SKERTEN,

JOSEPH LAKE.

No. 888,986.

PATENTED MAY 26, 1908.

A. FORD.

DEVICE FOR REGULATING AND JUSTIFYING REPRODUCED SOUND.

APPLICATION FILED SEPT. 19, 1904.

Fig. 1.

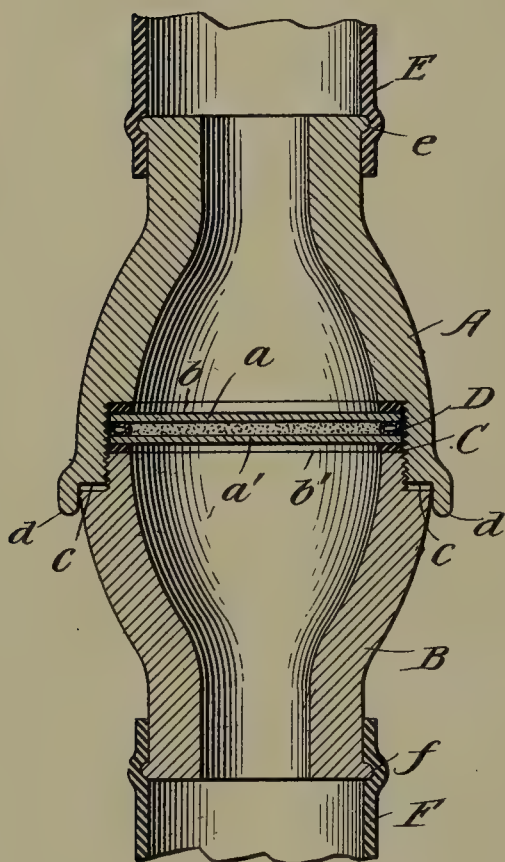


Fig. 2.

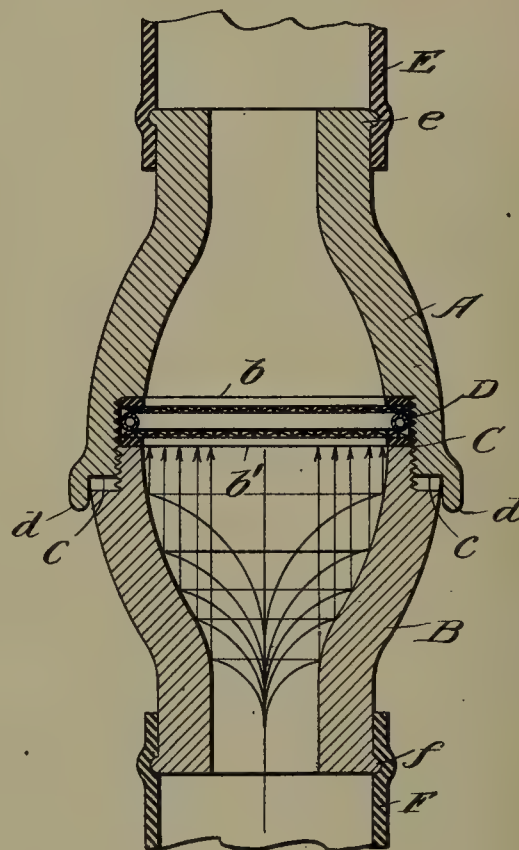


Fig. 3.

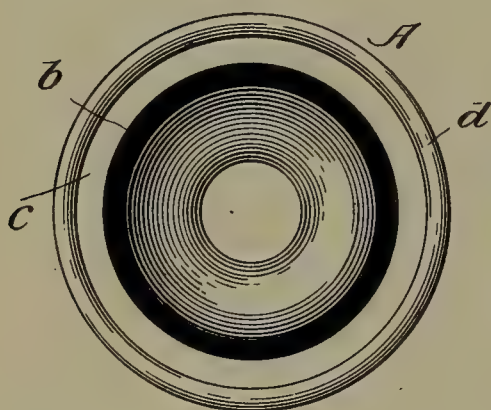


Fig. 4.

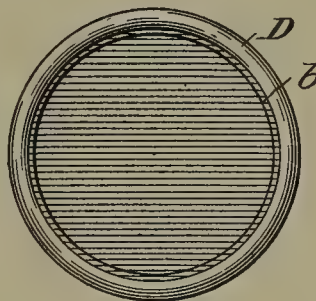
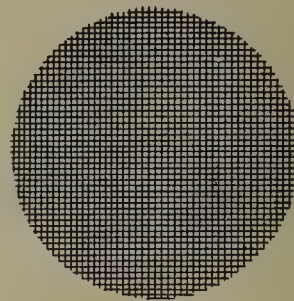


Fig. 5.



Witnesses

Edwin L. Bradford
H. N. Jenkins

Azel Ford
Inventor

By Henry S. Blackmore
Attorney

UNITED STATES PATENT OFFICE.

AZEL FORD, OF WASHINGTON, DISTRICT OF COLUMBIA.

DEVICE FOR REGULATING AND JUSTIFYING REPRODUCED SOUND.

No. 888,986.

Specification of Letters Patent.

Patented May 26, 1908.

Application filed September 19, 1904. Serial No. 225,067.

To all whom it may concern:

Be it known that I, AZEL FORD, a citizen of the United States, residing at Washington, in the District of Columbia, have invented
5 new and useful Improvements in a Device for Regulating and Justifying Reproduced Sound, of which the following is a specification.

This invention relates to an improvement
10 in devices to be attached to phonographs, graphophones, telephones, and other sound-producing apparatus, and has for its object the elimination of harsh, shrill, scraping, or other inharmonious sounds which have been
15 so prolific in apparatus of the aforesaid character hitherto, whereby the confusion and dissonance of vocal and instrumental sound waves, as reproduced hitherto, are prevented, and harmony and consonance attained.

My invention stated in general terms consists of a device interposed in the passage of the produced and reproduced sound waves of such a character that the inharmonious
20 produced sound waves are segregated or destroyed without interference with the reproduced sound waves whereby the reproduced sound-waves are obtained with clearness and accuracy, and consists of a combination of elements and devices as herein
25 after clearly set forth, reference being had to the accompanying drawing, of which

Figure 1 is a longitudinal transverse section of the device with tube connections, enlarged, showing porous flexible diaphragms
35 having an intervening layer of granular carbon and separated by an air cushion and provided with means for bringing the diaphragms closer together by means of the screw-coupling. Fig. 2 is a like view of the
40 device provided with gauze diaphragms. Fig. 3 is an end view of one section of the device; and Fig. 4 is a view of a detached annular air cushion. Fig. 5 shows a gauze diaphragm.

In the drawings, A and B represent opposite sections of the device adapted to be connected by a screw-thread or coupling, as shown at C, and by which means they are
45 confined between the sections by washers a, a' , diaphragms b, b' , and an intermediate annular air cushion D, which are connected so as to secure the diaphragms a, a' at variable and adjustable distances apart by the pressure of the screw-threads in co-action
55 with the compressive and expansive action of the air cushion.

In Fig. 1 is represented a granular carbon layer inclosed between the porous diaphragms b, b' , retained between the same by the annular air cushion D, the outer ends of
60 the section being provided with a means e, f , for attaching the same to rubber or other tubes or sound-conveying conduits E, F. The section A is provided with an annular extension d whereby it projects over the adjacent end of the opposite section B.

Fig. 2 is a like view of the device provided with woven wire or gauze diaphragms b, b' which are separated from each other by the
70 annular air cushion D.

Fig. 3 is a view of the inner end of section A of the device.

Fig. 4 is a view of the annular air cushion; and Fig. 5 represents a foraminous diaphragm.
75

In assembling the device, the washer a is placed within the section A and thereupon is placed a diaphragm of material selective to the character of the instrument to which applied, upon which is placed an annular
80 cushion consisting preferably of a hollow annular ring retaining air under pressure. Upon this is placed a second diaphragm a' and a second ring or washer b' , which are maintained in position by coupling to the
85 section B by means of the screw-thread C. It will be seen that upon more closely coupling these sections by screwing the same together the annular cushion is compressed and the diaphragms brought closer together. The
90 object of this is to provide an adjustable means for regulating the distances whereby the diaphragms may be maintained at varying distances from each other, it having been found of great advantage to so adjust the
95 diaphragms in order to synchronize them in accordance with the differing inharmonious sound waves evolved by various sound-reproducing devices which inharmonious sound waves are conveyed to and through
100 the conduits E, F, communicating with the sound-regulating and justifying diaphragms a, a' .

My improved apparatus consists of two bell-mouth devices, preferably composed of
105 hard rubber provided with coupling screw-threads whereby they may be joined and provided also with means whereby diaphragms of selective sound wave-analyzing and dissipating properties may be inclosed,
110 and further provided with means whereby the opposite ends of the coupled device may

be attached to a sound-reproducing apparatus in such a manner as to interpose the included sound wave analytical diaphragm between the point at which the sound is re-
 5 produced and the point at which the sound is discharged.

It is well known that in reproduced vocal and musical and other sounds of phonograph, graphophone, gramophone, etc., the
 10 vibrations produced by the indentations and projections in the path of the needle of the sound-reproducing diaphragm are accompanied by additional interfering inhar-
 15 monious sound waves generated or produced by the frictional tendencies of the needle in the channel guiding the needle over the aforesaid indentations and projections, which inhar-
 20 monious sound waves have a tendency to confuse or obscure the harmonious sound waves desired to be reproduced. It is my object, therefore, to interpose in the path of
 25 the multiple sound waves, reproduced and produced as aforesaid, a diaphragm of such character as to selectively isolate and destroy the inharmonious produced waves by means
 30 of an element capable of synchronously producing sound waves of like inharmonious character whereby the originally produced inharmonious waves are neutralized at the
 35 nodal point of their sound wave communication. This effect may be produced by interposing in the passage of the composite sound waves, vibratory diaphragms of foraminous
 40 nature with sufficiently small apertures to readily take up and destroy the inharmonious sounds, or may consist of various substances capable of vibration of any selective
 45 character, such as porous flexible diaphragms retaining pulverized carbon, or other inharmonious sound-deadening substance.

By interposing in the path of the reproduced sound waves a device of this character, I am enabled to analyze or separate there-
 50 from disagreeable and inharmonious sound waves generated frictionally or otherwise through the imperfect action of the sound wave-reproducing devices thereby delivering
 55 the sound in perfect reproduction without the usual accompanying inharmonious sound waves.

Diaphragms of thin wood, paper, felt, sponge, and the like may be employed accord-
 60 ing to the particular character of the sound waves desired to be deadened or separated in the justification of the particular sound
 65 desired to be reproduced.

It should be noted that the sections A, B, of my device are conical or bell-shaped whereby the sound waves are concentrated
 70 upon the sound-justifying diaphragms and the diaphragms may be graduated in thick-
 75 ness or character of substance and circum-
 80 centrically to conform with the direction upon which particular sound waves are
 85 reflected.

Fig. 2 illustrates diagrammatically the manner in which the sound waves, entering in concentrated or blended form, are ana-
 90 lyzed and separated from each other, by the varying reflective surface of the interior of the conical or bell-shaped section B, in par-
 95 allel and concentric form, with reference to the varying vibratory tension of each sound wave in the volume, so that the separate, distinct and individual sound waves, form-
 100 ing a part of the composite blend of the sound wave volume, are circum-centrally reflected from its selective cycle point and delivered upon the sound-justifying dia-
 105 phragm in selective concentric circles, at which point any one or more of the individual sound waves thus analyzed may be absorbed, neutralized, or dissipated at its point of loca-
 110 tion, by the effect of the justifying diaphragmic device, while the uninterrupted or unobstructed sound waves, which have not
 115 been in interference, pass through the composite diaphragm and are delivered concentrically upon the concentrating sound reflective surface of the outlet section A, whereby
 120 the remaining or justified sound waves are reblended in a harmonious volume, by synthesis, and delivered from the device minus the inharmonious waves as originally com-
 125 municated or conveyed to the apparatus. It will thus be seen that the volume of com-
 130 positely blended sound waves are circum-centrally separated into distinct and individual waves by the conical or bell-shaped sound reflective surface of the interior of section B, which individual sound waves, thus
 135 separated, are delivered upon the sound-justifying diaphragms in concentric form.

By employing sections interiorly of conical or bell-shaped character the various
 140 sound waves entering the section are separated, analyzed, or reflected circum-centrally upon the diaphragms so that circum-centric amplifying or resistant substances of
 145 selective action with reference to the particular sound wave delivered upon the diaphragm at a particular point may be employed in connection with the diaphragms for the purpose of
 150 deadening, destroying, or separating inharmonious sound waves from the sounds desired to be clearly reproduced.

In cases where the inharmonious sound waves occur in varying degrees as delivered
 155 from the various sound-reproducing machines, substances of selective deadening effect to the particular inharmonious sound waves and of yielding nature, such as soft
 160 rubber, may be placed between the diaphragms at selected points and caused to occupy more or less field upon the diaphragm
 165 by expansion and contraction of the same accordingly as pressure is exerted upon or removed from them through the agency of the screw-threaded coupling devices.

I do not desire to confine myself to the par- 130

particular character of screw-threaded coupling devices, but reserve the right to use any practical means for joining the sections A, B, and I can also make the diaphragms independent of the screw-threaded coupling device and provide other means for adjusting or controlling the distance between the diaphragms without departing from the spirit of my invention.

I also intend to include as a feature of my invention the devices as aforesaid provided with a means for revolving the diaphragms whereby the position of the selective sound-interfering substances may be regulated and brought into action at will.

I have found it of advantage to employ two separate diaphragms, one of which is shown in Fig. 4, composed of a multiplicity of parallel wires or other equivalent and use them collectively either disposed with wires parallel or across or angular of each other.

I do not desire to confine myself to any particular character or porous diaphragm or substance of which composed to be interposed in the path of the sound waves between the point of production and the point of discharge, but reserve the right to employ any or all forms of porous substances which may be selectively adapted to the particular character of sound wave desired to be neutralized or justified, so long as the diaphragms exist in plurality and are of such porous and adjustable character that they may be brought into co-action or synchronism with the inharmonious sound waves accompanying reproduced sounds, which it is desired to eliminate.

It should be noted that the diaphragms employed in my device are of a different and distinct character from the non-porous, fixed and flexible diaphragms employed in telephone transmitters and receivers, phonographic recorders, sound reproducers and the like, in that the diaphragms employed for the purposes mentioned have for their object the reproduction of sound waves or the production of devices from which the sound waves may be produced and are dependent upon the reception of sound waves at one side of the diaphragm to produce a vibration of the diaphragm from which, by various means, the sound waves are reproduced by the actuation of the opposite side of the diaphragm, while the diaphragms employed by me are of such character as to allow the air-carrying sound-producing waves to pass through the pores or between the interstices thereof in such a manner that harmonious waves are uninterrupted while the inharmonious waves are abstracted and dissipated. This, as has been hereinbefore described, is accomplished by adjustably causing the porous or foraminous diaphragms to approach or recede from each other or the position of the pores, perforations or meshes of the diaphragms rotatably adjusted so that the points through

which the free passage of the air-carrying sound waves passes may be regulated with reference to each other so as to meet the exigencies of the various harmonious and inharmonious sound waves with reference to their separation from each other in a simple and efficient manner.

My diaphragms are therefore distinguished from the flexible sound-reproducing diaphragms of the prior art by the fact that they allow the air-carrying sound waves to pass through them and are so adjusted with reference to each other that they practically constitute a filtering device for incomplete and disturbing inharmonious or unsynchronized waves from the harmonious or synchronized waves during their passage there-through.

The term "porous" as employed in this specification and claims with reference to the character of the diaphragms has particular reference to, and is intended to include, diaphragms which will allow air-carrying sound waves to pass therethrough, be the passages pores, perforations, meshes or spaces of any kind or character so long as air-carrying synchronized sound waves of harmonious character are allowed to pass without material interception.

One of the important features and adaptations of my invention is its utility when employed in connection with telephonic and phonographic receivers adapted to communicate directly with the human ear, so that the sound waves reproduced in the receiver may be regulated and adjusted as to pitch without interference with the timbre of the sound waves reproduced or transmitted. By the application of my device, therefore, the highness or lowness of pitch may be either lowered or raised, without destroying the timbre, to a degree that the reproduced sound waves will be clearly audible, and thus it regulates sharpness and harshness or lowness and inaudibility of the sound waves as received or reproduced in telephones or phonographs, and renders them readily adjustable by raising or lowering the pitch without interfering with the timbre so that the sound waves received may be adjusted with those transmitted and with reference to the tympanum of the human ear of various people as to be clearly distinguishable and audible whether the ear of the person receiving the sound waves be more or less sensitive or whether the timbre of the voice of the person transmitting the sound is of high or low pitch. For example, the tympanum of one's ear may be so constructed with relation to the sound waves received by it from a telephone or phonograph that the pitch of the sound received may be so high, sharp or harsh that it will result in the sounds transmitted thereto not becoming clearly audible, such high, sharp or harsh tones emanating from the

sound receiver or reproducer being due to the differing and irregular forms and thickness of the sound-reproducing diaphragms, such as sheets of mica, the vibration of which is actuated by magnetic action in the telephone and the stylus in the phonograph, regardless of the actual pitch of the sound originally communicated to the sound-reproducing device; the pitch in various telephonic receivers differing from the sound waves originally transmitted by reason of their difference in diameter and thickness, resulting in more or less rapidity of vibration and consequent pitch without regard to the timbre of the sound as originally transmitted. It can be seen, therefore, that my device will regulate the sound-producing vibrations emanating from the receiver or reproducing diaphragm and will provide a means whereby the pitch of the sound emitted from various diaphragms may be justified, regulated or synchronized with each other and with relation to the particular sensitiveness of the tympanum of the ear receiving the sound therefrom.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A sound receiving and distributing device including a plurality of sound justifying diaphragms containing independent sets of parallel wires, said diaphragms being capable of transmitting sound waves of harmonious character, and of eliminating and subduing inharmonious sound waves.

2. A sound receiving and distributing device including a plurality of sound justifying diaphragms containing parallel wires, said diaphragms being rotatably movable with reference to each other, and capable of transmitting sound waves of harmonious character, and of eliminating and subduing inharmonious sound waves.

3. A sound receiving and distributing device including a plurality of sound justifying diaphragms containing parallel wires, said diaphragms being rotatably movable in the planes in which they lie, and capable of transmitting sound waves of harmonious character, and of eliminating and subduing inharmonious sound waves.

4. A sound receiving and distributing device including a plurality of sound justifying diaphragms containing parallel wires, said diaphragms being rotatably movable in the planes in which they lie, and means for rotating said diaphragms.

5. A sound receiving and distributing device including relatively movable porous justifying diaphragms which are capable of transmitting sound waves of harmonious character, and of eliminating or subduing inharmonious sound waves, combined with sound deadening substances for inharmonious sound waves disposed between said diaphragms and means for adjustably increasing or decreasing the sound deadening zone.

ing or decreasing the sound deadening zone.

6. A sound receiving and distributing device including an adjustable sound justifying diaphragm provided with a plurality of independent sets of parallel wires, means for rotating the said diaphragm, and means for transmitting sound waves of harmonious character from, and delivering inharmonious sound waves to the said sound justifying diaphragm.

7. A sound receiving and distributing device including sound justifying diaphragms which are capable of transmitting sound waves of harmonious character and of eliminating or subduing inharmonious sounds, combined with a resilient element separating said diaphragms and adjusting means for compressing said resilient element and thus varying the distance between the diaphragms to synchronize the instrument.

8. A sound receiving and distributing device including relatively movable porous sound justifying diaphragms which are capable of transmitting sound waves of harmonious character, and of eliminating or subduing inharmonious sound waves, combined with sound deadening substances for inharmonious sound waves disposed between said diaphragms.

9. A sound receiving and distributing device including relatively movable porous sound justifying diaphragms which are capable of transmitting sound waves of harmonious character, and of eliminating or subduing inharmonious sound waves, combined with sound deadening substances for inharmonious sound wave disposed between said diaphragms at selected points.

10. A sound receiving and distributing device including sound justifying diaphragms having passages for transmitting sound waves of harmonious character therethrough, said diaphragm being capable of eliminating or subduing inharmonious sound waves combined with conical or bell shaped sections between which said diaphragms are supported.

11. In a sound receiving, justifying, and distributing device, the combination of an analytical member, a synthetical member, and an intervening sound-justifying member capable of transmitting sound waves of harmonious character and of eliminating or subduing inharmonious sound waves.

12. In a sound-receiving, justifying, and distributing device, the combination of an analytical member, a synthetical member, and an intervening adjustable sound-justifying member capable of transmitting sound waves of harmonious character and of eliminating or subduing inharmonious sound waves.

13. In a sound-receiving, justifying and distributing device, the combination of an

analytical member having a flaring sound-reflective surface, a synthetical member, and an intervening sound-justifying member capable of transmitting sound waves of harmonious character and of eliminating or subduing inharmonious sound waves.

14. In a sound-receiving, justifying and distributing device, the combination of an analytical member having a flaring sound-reflective surface, a synthetical member, and an intervening adjustable sound-justifying member capable of transmitting sound waves of harmonious character and of eliminating or subduing inharmonious sound waves.

15. In a sound-receiving, justifying and distributing device, the combination of an analytical member, a synthetical member having a contracting sound-reflective surface, and an intervening sound-justifying member capable of transmitting sound waves of harmonious character and of eliminating or subduing inharmonious sound waves.

16. In a sound-receiving, justifying and distributing device, the combination of an analytical member, a synthetical member having a contracting sound-reflective surface, and an intervening adjustable sound-justifying member capable of transmitting

sound waves of harmonious character and of eliminating or subduing inharmonious sound waves.

17. In a sound-receiving, justifying and distributing device, the combination of an analytical member having a flaring sound-reflective surface, a synthetical member having a contracting sound-reflective surface, and an intervening sound-justifying member capable of transmitting sound waves of harmonious character and of eliminating or subduing inharmonious sound waves.

18. In a sound-receiving, justifying and distributing device, the combination of an analytical member having a flaring sound-reflective surface, a synthetical member having a contracting sound-reflective surface, and an intervening adjustable sound-justifying member capable of transmitting sound waves of harmonious character and of eliminating or subduing inharmonious sound waves.

In testimony whereof I affix my signature, in presence of two subscribing witnesses.

AZEL FORD.

Witnesses:

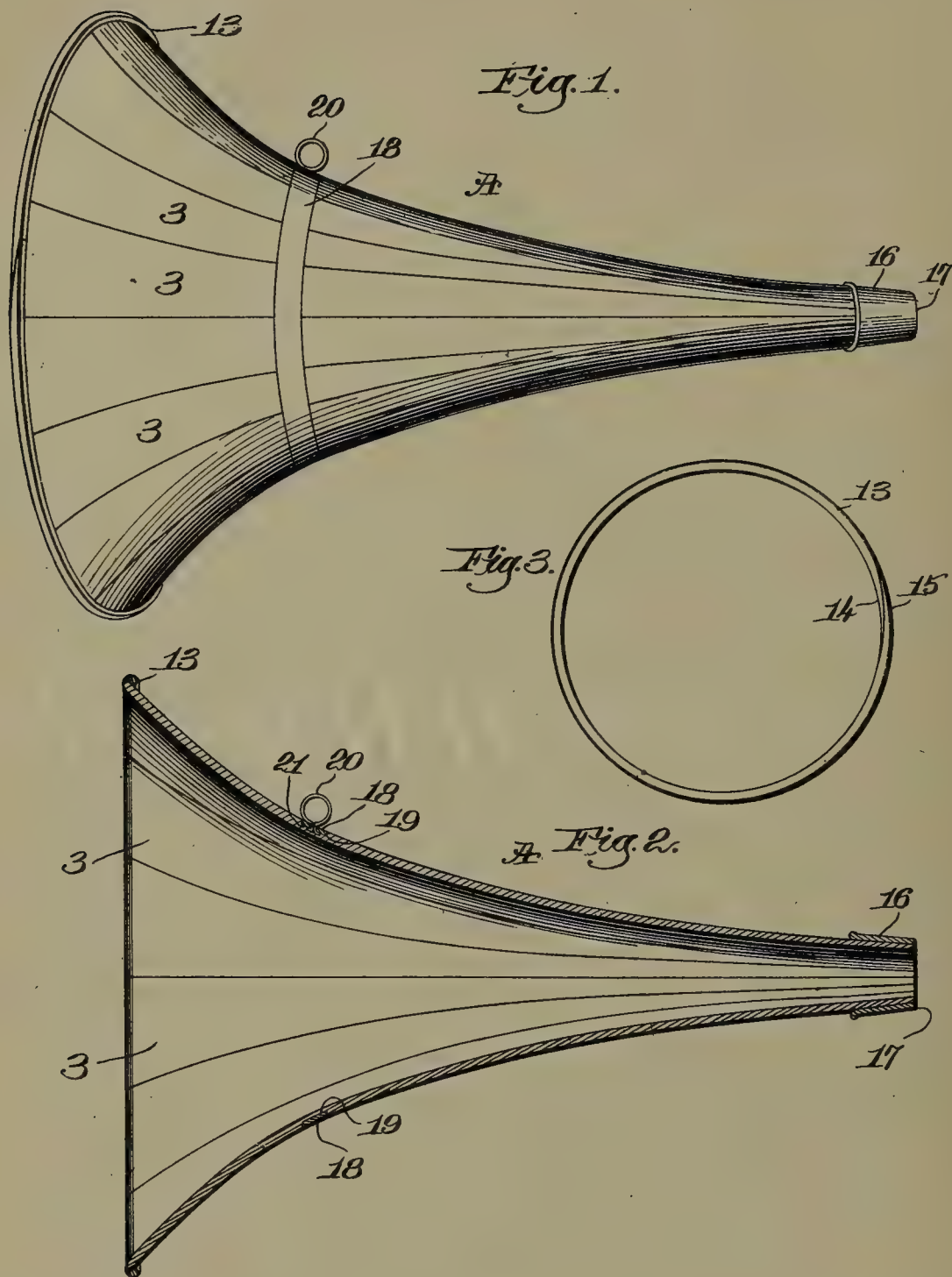
GEO. C. TABOR,
C. R. ADAMS.

S. MOSS.

HORN FOR TALKING MACHINES.

APPLICATION FILED APR. 6, 1908.

2 SHEETS—SHEET 1.



WITNESSES:

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Amelia M. Ross

INVENTOR

Stanislaus Moss,

BY

Robt P. Haine

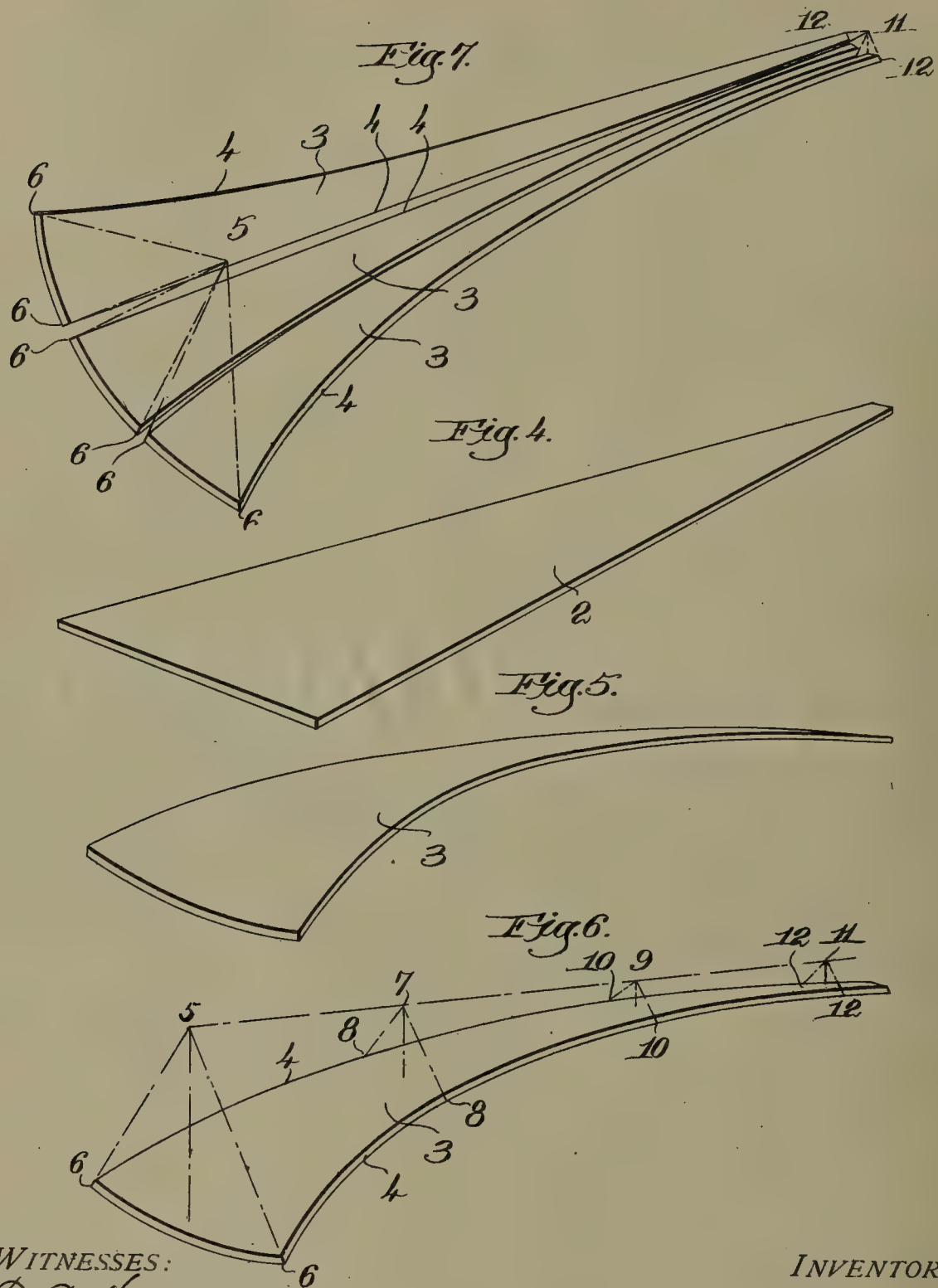
Attorney

S. MOSS.

HORN FOR TALKING MACHINES.

APPLICATION FILED APR. 6, 1908.

2 SHEETS—SHEET 2.



WITNESSES:

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Amelia M. Ross

INVENTOR

Stanislaus Moss,
BY Robt. P. Haines
Attorney

UNITED STATES PATENT OFFICE.

STANISLAUS MOSS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO SHEIP & VANDERGRIFT, INC., OF PHILADELPHIA, PENNSYLVANIA.

HORN FOR TALKING-MACHINES.

No. 889,480.

Specification of Letters Patent.

Patented June 2, 1908.

Application filed April 6, 1908. Serial No. 425,366.

To all whom it may concern:

Be it known that I, STANISLAUS MOSS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented an Improvement in Horns for Talking-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The invention to be hereinafter described relates to horns for talking machines and more particularly to that general type of such devices employed in connection with sound recording and producing instruments, commonly known as phonographic horns.

In order that sound waves may be produced or transmitted with substantial perfection, it is essential that the transmitting instrument shall offer no obstruction to the free vibratory or other sound wave movements, and that its transmitting surface present no abrupt or angular change of direction, either in the line of transmission or transverse thereto. It is of importance also that the transmitting instrument itself shall not give forth vibrations calculated to interfere with the sound waves, all as well understood by those skilled in the art. These considerations are particularly true in the production and transmission of musical tones, so much so that even slight interference with the true sound wave movements, either by abrupt angular changes in direction of transmission by the horn itself, or discordant vibrations in the horn material, becomes a matter of serious objection.

It has been proposed heretofore to construct horns for sound reproducing machines of metal either of a single piece or number of pieces joined together by a seam extending longitudinally of the horn. The metallic vibration interjected by such horns is well recognized, and the joints or seams offer objectionable interruptions to the sound waves. It has also been proposed to form horns of wooden strips laid together in two or more layers or plies to break joints, the strips of the several plies mutually contributing to hold the strips of the other from separation at their edge joints. In such veneer construction, however, strips forming the inner ply, along the surface of which the sound waves travel, are not transversely curved into a

true circle as prescribed by the dimensions of the horn at any point in its axial length, and, moreover, there is an interruption in the continuity of the inner horn surface near the flare of the horn where the outer strips cover the spaces between the edges of the inner strips, with the result that there is an objectionable interference with the transmitted sound. It has been further proposed to form phonographic horns of a single ply or layer of strips by assembling a number of the strips and then subjecting them to endwise and lateral compression to secure the desired horn contour, but in such construction the edges of the strips do not present surfaces which can be brought into close union and joined, the result being that the strips separate along their adjacent edges. Moreover, in this construction the individual strips do not present true circular curves throughout the axial length of the horn.

With these briefly stated considerations in view the present invention has for its object to provide a phonographic or like horn which shall be free from the objections noted, and present a structure formed of a single layer of thin wooden strips; which, previous to being assembled, are permanently bent longitudinally and transversely to give to the horn its proper longitudinal shape and transverse circular form, and wherein also the edges of the strips are beveled to present each to the adjoining strip, a contacting surface susceptible of being permanently connected throughout with no interiorly projecting interruptions to the sound waves either transversely or longitudinally, all as will hereinafter more fully appear.

In the drawings:—Figure 1 is a side perspective view of a horn embodying the features of the present invention; Fig. 2 is a central longitudinal section thereof; Fig. 3 is a detail view of the strengthening hoop which is secured to the flaring end of the horn; Fig. 4 is a perspective view of one of the wooden blanks prior to being bent longitudinally and transversely; Fig. 5 is a similar view of the blank of Fig. 4 after being permanently bent longitudinally and transversely, but prior to the bevel formation of its longitudinal edges; Fig. 6 is a view similar to Fig. 5, showing the previously bent strip provided with the radially beveled edges; and Fig. 7 is a perspective view of

three of these permanently bent strips showing how they are assembled with the radially beveled edges face to face.

As shown in the drawings, the horn of the present invention is composed of a plurality of strips 3, preferably formed of thin tapering pieces of wood joined edge to edge, it being an important feature of the invention that such strips be previously bent both longitudinally and transversely in response to the curvature of the horn, and that such edges be so formed as to present contacting surfaces throughout their length when brought together. In order that this result may be properly secured, the strips are first produced as flat, tapering pieces of thin wood 2, Fig. 4, and these individual strips are then bent in a suitable mold, both longitudinally and transversely. The longitudinal bend is determined by the longitudinal form or flaring character of horn, and the transverse bend at any point in the length of the strip is determined by the arc of a circle, the radius of which is the semi-diameter of the horn at such point, so that throughout the length of the horn a substantially true and unobstructed circular interior surface will be formed. The strips, thus bent, are indicated at 3, Fig. 5, said bends, lengthwise and transversely of the strips, being made permanent by the application of heat while in the mold. After the strip has thus been permanently bent, as in Fig. 5, the longitudinal edges 4, 4, are cut to a bevel on the lines 5, 6, Fig. 6, the bevel at any point in the length of the horn corresponding to the direction of a radius of the horn at that point. Thus the angle of the bevel of the edge 4 near the flared extremity of the horn will be represented, Fig. 5, by the line 5, 6, the numeral 5 representing the center of the circle of horn curvature at that point. Likewise the bevel of the edge 4 at intermediate points in the length of the strip 3 will correspond to the lines 7—8; 9—10; 11—12; the numerals 7, 9 and 11 representing the center of horn curvature at that particular point.

Viewing Fig. 7, it will now be clear that, since the edges 4, 4, of each of the strips 3 are cut on the same bevel, or line 5—6, for instance, at any point, the faces of the edges 4, 4, of adjoining strips will present flush or abutting surfaces which may be brought into full contact throughout the length of the strips notwithstanding the fact that the strips are curved both longitudinally and transversely. The beveled surfaces of the edges 4, 4, are then glued together, and the strips themselves being permanently bent, the glue connection between such edges acts as a sufficient binder to hold the assembled strips in position.

At the flaring end of the horn A, Fig. 1, a wooden hoop 13 is glued, said hoop being preferably formed of a single strip of wood

having overlapping ends 14, 15, suitably connected, as by glue or the like. The smaller end of the horn A, Figs. 1 and 2, is supplied with a ferrule 16, preferably of metal, and, as indicated, this ferrule has its extreme end 17 flush with the transverse plane of the horn at that end, so that no projection extends into the interior of the horn tending to disturb the true sound waves transmitted.

At some point intermediate its ends the horn A, Figs. 1 and 2, is preferably encircled by a textile band or tape 18. This band or tape 18 is countersunk into the exterior surface of the horn, the strips 3 being provided with an exterior transverse groove 19, Fig. 2, so that the band or tape, while serving to increase the security with which the strips are held together, is prevented from displacement on the incline surface of the horn. Obviously the number of bands or tapes 18 employed on any particular horn is not material, as such number may be varied according to the particular circumstances or as the judgment of the constructor may dictate. In applying the band or tape 18, it is preferably moistened or saturated with glue, and in such condition is stretched and laid in the groove 19 with its ends overlapping. On drying, the band or tape will shrink, thus binding the strips 3, edge to edge permanently, in a manner that will be well understood.

It is sometimes desirable to support the horn from a point beyond its smaller end by suspending it from a rod, stand, or the like. Means are herein provided for this purpose, such as an eye 20, Figs. 1 and 2, the ends 21, 21, being preferably passed through the band or tape 18 before it is applied, and bent as indicated in Fig. 2, said bent ends 21, 21, when the tape is in place resting between the under surface of the tape and the outer wall of the groove 19. Thus the suspending means or eye 20 does not extend through or into the wall of the horn, and offers no objectionable element in the transmission of sound by the horn. Obviously the band or tape and suspending eye may be applied in a variety of ways, but it is preferable, as found in practice, that the band or tape be secured in a groove in the horn, and that it be formed of textile material that will contract or shrink in drying, as thereby the band or tape not only will not become displaced in use but will hold the strips 3 more securely with their radially beveled faces in uniform contact.

From the construction described it will be noted that a horn is produced of a single layer of thin wooden strips previously bent both in a longitudinal and transverse direction; that the adjacent edges of the strips are beveled after the strips are bent, so that edge faces extending in the direction of the

radius of the horn are produced throughout the length of the strips even though the strips themselves vary in curvature at different points; and that the radially beveled edges present contacting faces throughout. Obviously, also, the cross-sectional contour of the horn at any point will present a substantially true circle, there being no shoulders, angles, or interruptions to the interior horn surface either transversely or longitudinally.

What is claimed is:—

1. A horn for talking machines comprising a conically tapering body composed of a single layer of individual wooden strips previously bent into permanent shape both longitudinally and transversely, the longitudinal edges of said strips being beveled radially of the horn throughout their length to present adjacent faces coincident throughout, and means to hold said strips in assembled relation edge to edge.

2. A horn for talking machines comprising a conically tapered body composed of a single layer of individual wooden strips previously bent into permanent shape both longitudinally and transversely and glued together edge to edge, the longitudinal edges of said strips being beveled radially of the horn throughout their length to present plane faces coincident throughout.

3. A horn for talking machines comprising a conically tapered body portion composed of a single layer of individual wooden strips previously bent into shape both longitudinally and transversely, the longitudinal edges of said strips being beveled radially of the horn throughout their length to present contacting plane faces coincident throughout, the said radial plane faces of adjoining strips being glued together, the exterior surface of the horn being provided with an encircling band or tape.

4. A horn for talking machines comprising a single series of tapering wooden strips bent in both a longitudinal and transverse

direction, and having edge faces coincident throughout and provided with an exterior encircling groove, and a textile band or tape passing around the horn and seated in said encircling groove.

5. A horn for talking machines comprising a single series of tapering wooden strips bent in both a longitudinal and transverse direction and glued together edge to edge said edges having faces coincident throughout, a band or tape passing around said horn, and means secured to said band or tape for supporting the horn.

6. A horn for talking machines comprising a single series of tapering wooden strips bent in both a longitudinal and transverse direction, and glued together edge to edge, the said horn having an encircling exterior groove, a textile band or tape passing around said horn and seated in said groove, and a supporting eye secured to said tape.

7. A horn for talking machines comprising a single series of tapering wooden strips previously bent into shape both longitudinally and transversely and having edge faces coincident throughout, and glued together, and a textile band encircling the horn intermediate its ends.

8. A horn for talking machines comprising a single series of wooden strips previously bent longitudinally and transversely and having beveled edges, the beveled edges of one strip being glued to the beveled edges of the next adjoining strips, a ferrule embracing the strips at the smaller end of the horn and terminating flush with the end of the horn, and a textile band or strip encircling the horn intermediate its ends.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

STANISLAUS MOSS.

Witnesses:

RICHARD ZOERNER,
F. W. HUDTWALCKER.

T. KRAEMER.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED OCT. 7, 1907.

Fig. 1,

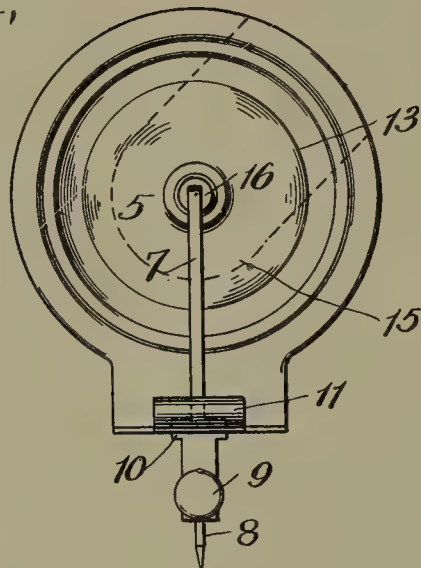


Fig. 2,

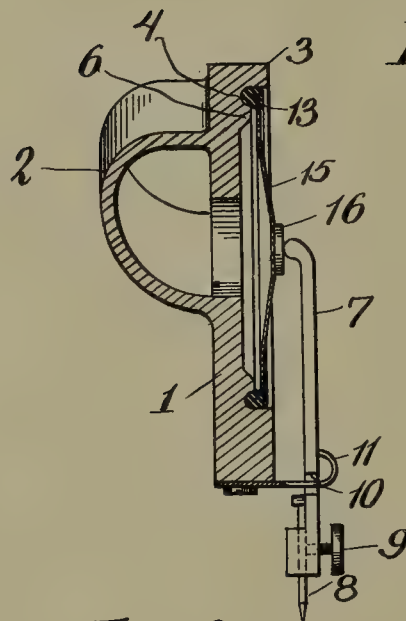
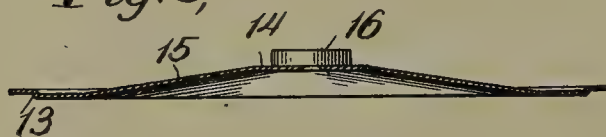


Fig. 3,



WITNESSES:
J. M. Dutch
H. Edwards.

INVENTOR
Thomas Kraemer,
BY
H. Edwards
ATTORNEY

UNITED STATES PATENT OFFICE.

THOMAS KRAEMER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

SOUND-BOX FOR TALKING-MACHINES.

No. 890,142.

Specification of Letters Patent.

Patented June 9, 1908.

Application filed October 7, 1907. Serial No. 396,135.

To all whom it may concern:

Be it known that I, THOMAS KRAEMER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Sound-Boxes for Talking-Machines, of which the following is a specification.

This invention relates to sound-boxes for talking machines and has reference more particularly to the construction of the diaphragms for such sound-boxes.

The object of the invention is to effect certain improvements in the construction of such diaphragms to the end that a greater volume of sound is obtained in reproducing a record and that a more faithful reproduction is obtained as a result of the elimination of false sound vibrations.

I have illustrated the preferred embodiment of my invention in the accompanying drawings, in which

Figure 1 is a front view of a sound-box, Fig. 2 is a central section of the same, and Fig. 3 is an enlarged sectional view of the diaphragm alone.

Referring to these drawings, the sound-box is shown as having a main wall 1, a tubular extension 2 leading therefrom for connection to the sound-conveying tube, and a circular flange 3 at the outer edge of wall 1 forming the outer wall of the box. Fitting snugly within wall 3 is a rubber strip or ring 4, circular in cross-section, forming a support for the diaphragm 5, this ring being retained in position by a circular ridge 6 integral with and rising from the wall 1. The stylus-lever 7 is pivotally mounted upon the wall 3, bears at its inner end upon the central portion of the diaphragm, and at its outer end is provided with an opening to receive a stylus 8, the latter being held in its opening by a set-screw 9. In the present instance, I have shown the stylus-lever as provided with notched lugs 10 adapted to receive knife-edges formed on a sheet-metal piece 11 which is secured to wall 1 and whose end forms a spring 12 tending to rock the stylus-lever on its knife-edge pivot in the direction to hold its inner end against the diaphragm.

The method of mounting the diaphragm herein shown with its edge bearing on a rubber ring has proven highly efficient as the rubber absorbs counter-vibrations and thus

makes the reproduced sound much more clear. The diaphragm, which is a disk of thin sheet-metal, is of a diameter but little less than the internal diameter of the circular flange 3 and when in proper position it rests upon the rubber ring 4 with its outer edge separated from the interior wall of flange 3 by a narrow space entirely around the diaphragm. It is difficult, however, to get the diaphragm in this position every time it is inserted and to retain it there during long periods of use of the sound-box and if the diaphragm becomes moved out of this position the small amount necessary to carry its edge into contact with the flange 3, the vibrations of the diaphragm will be transmitted to the sound-box and the reproduced sound will be much less clear and distinct. I therefore provide means for centering the diaphragm in position and holding it against such movement as would cause its edge to engage the wall of the box. This is accomplished by providing a circular rib 13 in the diaphragm concentric with and close to the outer edge thereof, such that when the diaphragm is in position, this rib will coact with the rubber ring 4 to obstruct movement of the diaphragm in the plane in which it lies.

In Fig. 2 of the drawings, it will be seen that the rib 13 is in coaction with the ring 4 and would preclude movement of the diaphragm in a vertical direction and that when in this position the edges of the diaphragm are separated from the wall of the sound-box. So long as the diaphragm is held in this position, the danger of transmitting the vibrations thereof to the walls of the sound-box is eliminated.

In diaphragms for sound-boxes as heretofore constructed, especially those which are flat disks, the vibrating area is small and therefore the air-pressure behind the diaphragm is also small. In accordance with my invention, I construct the diaphragm in such manner that the area of vibration is considerably increased. This is accomplished by pressing a comparatively large portion of the diaphragm at its center out of the plane thereof so that the central portion of the diaphragm swells out to one side. This is shown in Figs. 2 and 3, from which it will be seen that the center 14 of the diaphragm is displaced from the plane of the edge portion thereof. The inclined portion

15 joining the center 14 and the edge portion includes a considerable part of the total area of the diaphragm and when the stylus-lever is rocked to and fro on its pivot by the undulations of the record-groove, this entire inclined portion is caused to vibrate so that a vibrating area is obtained which is considerably larger than that obtained when a flat disk is employed as a diaphragm. This increased area of vibration results in increased air-pressure behind the diaphragm and both of these combine to give a considerably increased volume of reproduced sound.

The diaphragm above described may be pressed to the desired shape from a disk of sheet-metal and may therefore be manufactured at very low cost. A metallic button 16 is preferably secured to the center of the diaphragm on which the inner end of the stylus-lever bears.

Having now described my invention, what I claim as new therein and desire to secure by Letters Patent is as follows:—

1. The combination of a sound-box having an outer wall, a resilient member within said wall, and a diaphragm supported on said member with its edge out of contact with said wall, said diaphragm having a rib therein coacting with said member to prevent

movement of the diaphragm in the plane in which it lies, substantially as set forth.

2. The combination of a sound-box having an outer wall, a rubber ring within said wall, a ridge on the sound-box to retain said ring in position, and a diaphragm supported on said ring with its edge out of contact with said wall, said diaphragm having a rib therein close to its outer edge coacting with said member to prevent movement of the diaphragm in the plane in which it lies, substantially as set forth.

3. The combination of a sound-box having a wall and shaped to provide a surface within the box adjacent to said wall for supporting a diaphragm, and a diaphragm supported on said surface, said diaphragm having a rib therein coacting with a part of the box structure to preclude movement of the diaphragm in the plane in which it lies to carry its edge into engagement with said wall of the box, substantially as set forth.

This specification signed and witnessed this 30 day of Sept., 1907.

THOMAS KRAEMER.

Witnesses:

H. MEIER,

H. MUHLSCHLEGEL.

No. 890,338.

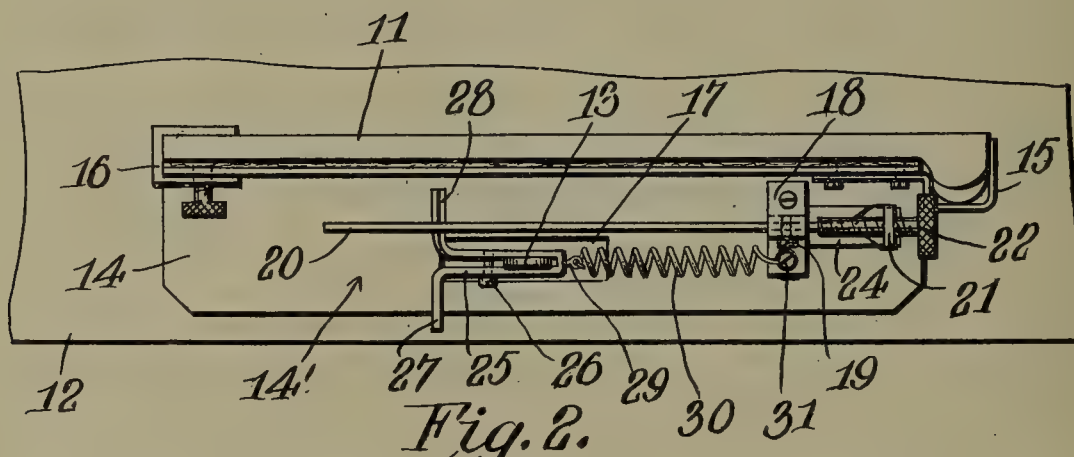
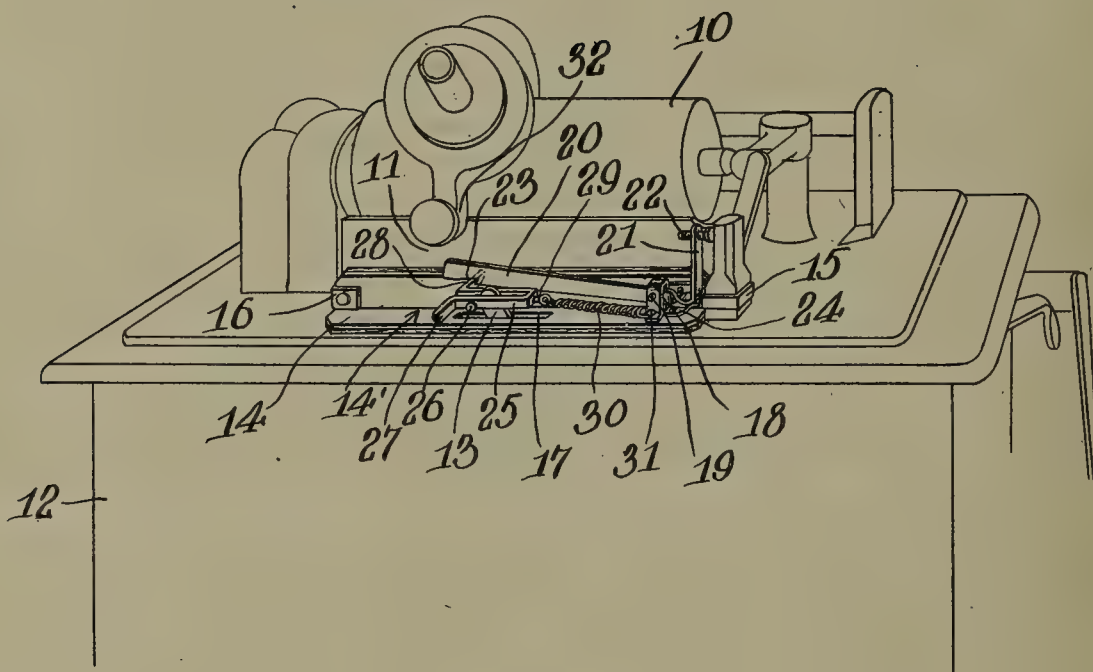
PATENTED JUNE 9, 1908.

C. P. COOK.

AUTOMATIC STOP FOR PHONOGRAPHS.

APPLICATION FILED OCT. 12, 1907.

Fig. 1.



Witnesses
C. E. Smith.
M. E. Kelly.

Inventor
C. P. Cook.
By Deeler & Robt
Attorneys

UNITED STATES PATENT OFFICE.

CHARLES P. COOK, OF PLYMOUTH, CONNECTICUT.

AUTOMATIC STOP FOR PHONOGRAPHS.

No. 890,338.

Specification of Letters Patent.

Patented June 9, 1908.

Application filed October 12, 1907. Serial No. 397,202.

To all whom it may concern:

Be it known that I, CHARLES P. COOK, a citizen of the United States, residing at Plymouth, in the county of Litchfield and State of Connecticut, have invented certain new and useful Improvements in Automatic Stops for Phonographs, of which the following is a specification.

This invention relates to talking machines or phonographs, and has particular reference to devices whereby such machines may be automatically stopped at the desired time at the end of the travel of the reproducer.

Among the special objects aimed at in the present invention are to provide a device of the character above described which is simple in construction, easy of application to the machine, and in which the parts are readily adjustable according to the various types of machines to which it is applicable and to compensate for variations according to the various requirements.

For a full understanding of the invention, including its advantages and mode of operation, reference is to be had to the following detail description, and to the accompanying drawings, in which:—

Figure 1 is a general perspective view of a fragment of a common type of phonograph or talking machine, with the present invention shown as applied thereto, and Fig. 2 is a plan view of the attachment.

In the several views of the drawings similar parts are referred to by like reference characters.

Having particular reference to the drawings by reference characters, the talking machine or phonograph is represented diagrammatically at 10, and the same includes a frame or flange 11 lying at one side of the record cylinder. Projecting upwardly through the casing 12 and at the outer side of the frame 11 is a starting lever 13. The parts thus far referred to are conventional. A base plate 14, made of any suitable material such as angle metal and having a horizontal and a vertical flange, is adapted to be detachably secured as by means of a bracket 15 and a clamp 16 to the aforesaid frame 11. The horizontal flange 14' of the base plate 14 is provided with a slot 17 which registers with the ordinary slot in the top of the casing 12 and through which the aforesaid lever 13 projects vertically.

Secured in any substantial manner as by screws near one end of the base plate 14 is a

vertical bracket 18 having a horizontal pivot 19, and on this pivot is journaled for oscillation in a vertical plane, a trip lever 20. The longer end or the body of this lever 20 lies substantially parallel with the record cylinder, and the shorter end thereof is upturned as at 21 and adjustably mounted in the upper end of the part 21 is a screw 22, lying substantially parallel with the aforesaid body portion of the trip lever. The longer end of the trip lever 20 is normally forced downwardly by any suitable means and said end is provided with engagement means such as a notch 23, the shoulder of which is directed outwardly with respect to the supporting pivot 19. As a convenient means for forcing the aforesaid outer end of the trip lever downwardly, there is employed a leaf spring 24, one end of which is secured to the bracket 18 and the free end of which lies in coöperative engagement with the short end 21 of said lever, forcing the latter upwardly.

A clamp 25 is detachably secured as by means of a screw 26 to the upper end of the starting lever 13. Said clamp is herein indicated as being U-shaped and the ends thereof are bent outwardly away from each other forming a finger piece 27 and a catch 28, the latter coöperating with the aforesaid notch 23. At the end of the clamp 25 on the opposite side of the starting lever 13 is secured as by an eyelet 29 a spring 30 whose other end is secured to some fixed point such as a binding screw 31 adjacent to the aforesaid bracket 18.

Having thus described the mechanical structure of the invention, its mode of application and operation will be appreciated: The base plate 14 is put in place on top of the machine with the starting lever 13 passed upwardly through the slot 17 and is then secured in place by the securing means 15 and 16. The clamp 25 is then secured at its desired adjustment on the upper end of the starting lever 13 so that the normal tendency of the spring 30 is to forcibly draw said lever toward the bracket 18, or to the right as indicated in the drawings. When it is desired to start the instrument the operator grasps the finger piece 27 and draws the clamp 25 and the starting lever against the tension of the spring 30 and brings the catch 28 into locking coöperation with the notch 23 of the trip lever. At the end of the run of the machine the lower end 32 of the reproducing arm will engage the end of the screw 22 and rock the trip lever on its pivot 19, against

the tension of the spring 24, and will thereby release the notched end of the said lever from the catch 28, allowing the force of the spring 30 to promptly and forcibly throw the lever 5 13 to the right and stop the machine. The screw 22, it will be understood, is adjustable longitudinally with respect to the path of movement of the arm 32 to vary the point or time at which the machine will be automatically stopped, according to the type of machines or the character of the record to be employed. The plane of the catch 28 is slightly at an angle to that of the finger piece 27 for the purpose of providing a more effective engagement with the notch 23.

As indicated in the drawings, it is desirable in the practical operation of the attachment that a layer of material such as felt, shall be placed between the flanges of the base plate and the casing of the phonograph, whereby any tendency of the attachment to cause rattling would be prevented.

Having thus described the invention what I claim as new and desire to secure by Letters Patent of the United States is:—

1. In an automatic stop mechanism for phonographs, the combination with a base plate and means to secure it in place, of an upright bracket secured to the said base plate, a trip lever journaled in said bracket for oscillation in a vertical plane, one end of the trip lever being turned at an angle to the main part thereof, a screw adjustably mounted in said lever end and lying substantially parallel with said main part, a starting lever clamp having a catch to coöperate with said trip lever and a finger piece, resilient means normally tending to rock the trip lever on its pivot in one direction, and means normally tending to draw the said starting lever clamp toward said bracket upon oscillation of the trip lever in the opposite direction, substantially as set forth.

2. In combination with a phonograph having a frame member, a starting lever, and reproducer arm, of an automatic stop mechanism therefor comprising a base plate,

means to secure the same to said frame member, a trip lever pivoted for oscillation, one end of said lever being notched and the other end being upturned at an angle to the main portion thereof, a screw mounted in said upturned end and lying in the path of said reproducer arm, a clamp adjustably secured to said starting lever and having a catch to coöperate with the notch aforesaid to hold the clamp and its lever in one position, and a spring attached to said clamp tending normally to draw said clamp and lever out of said position upon the occasion of contact of the reproducer arm with the said screw.

3. In an automatic stop mechanism for phonographs, the combination of a bracket, a trip lever pivoted thereto, one end of the said lever having a notch and the other end being turned at an angle to the main body portion thereof, a U-shaped clamp having at one end a catch to coöperate with the notch aforesaid, means to adjustably secure the clamp to a part to be moved, means to cause the trip lever to oscillate on its pivot, and a spring attached at one end to the said clamp and at the other end to the said bracket whereby on the occasion of the aforesaid oscillation of the lever to cause the release of the catch, the clamp is quickly moved.

4. The combination with a phonograph embodying a reproducer arm and starting lever, of stop mechanism comprising a clamp secured to the starting lever, and having an oppositely extending catch and finger piece, a spring connected with the clamp, and a trip lever engaging the catch of the clamp, to hold the spring under tension and the starting lever inoperative, and arranged for actuation by the reproducer arm to release the clamp and permit stopping of the machine by the starting lever.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES P. COOK.

Witnesses:

LENA C. McBURNEY,
SAMUEL WHEELER.

No. 890,534.

PATENTED JUNE 9, 1908.

H. SCHRÖDER.
PHONOGRAPH HORN.
APPLICATION FILED MAY 4, 1907.

Fig. 1

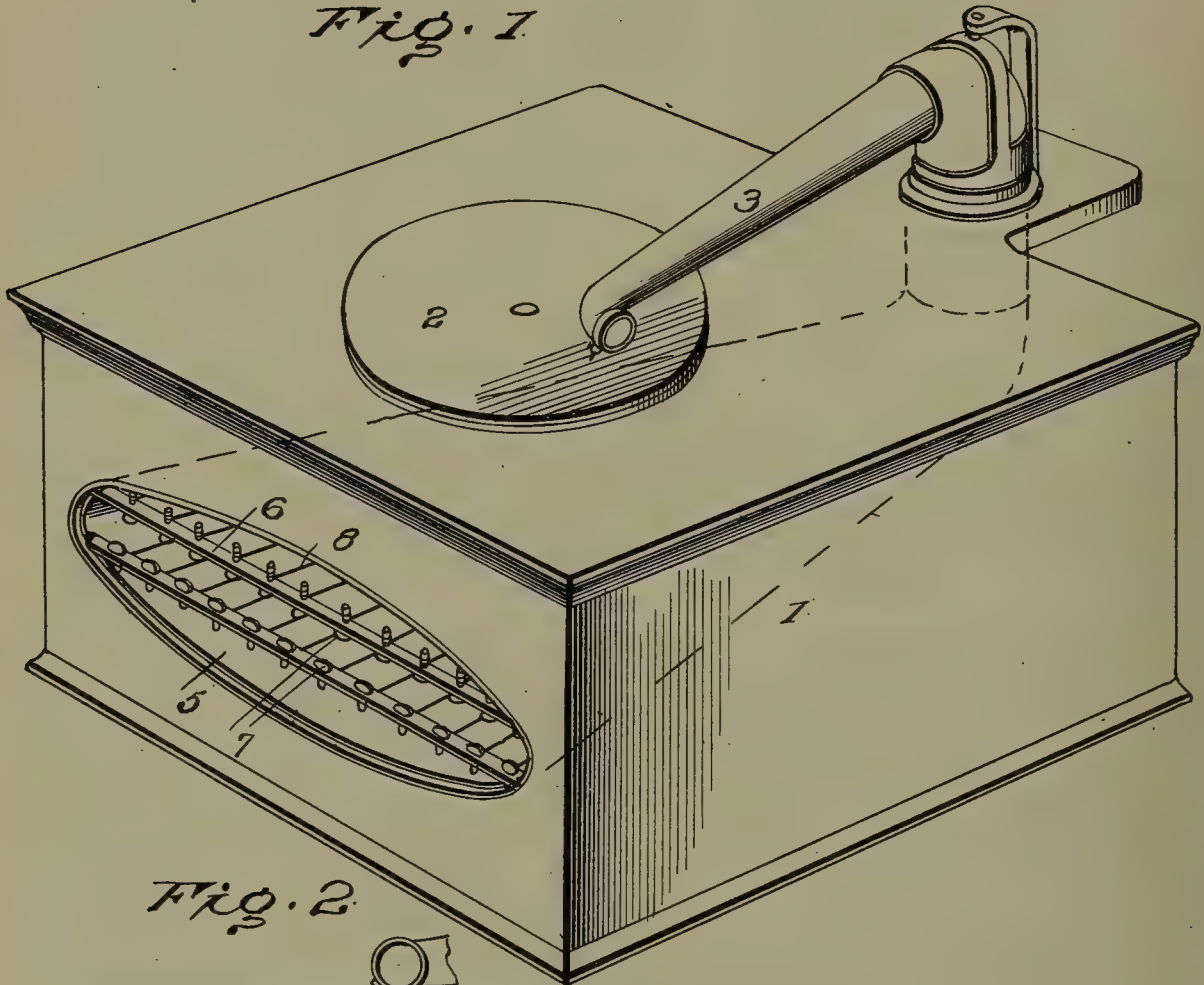
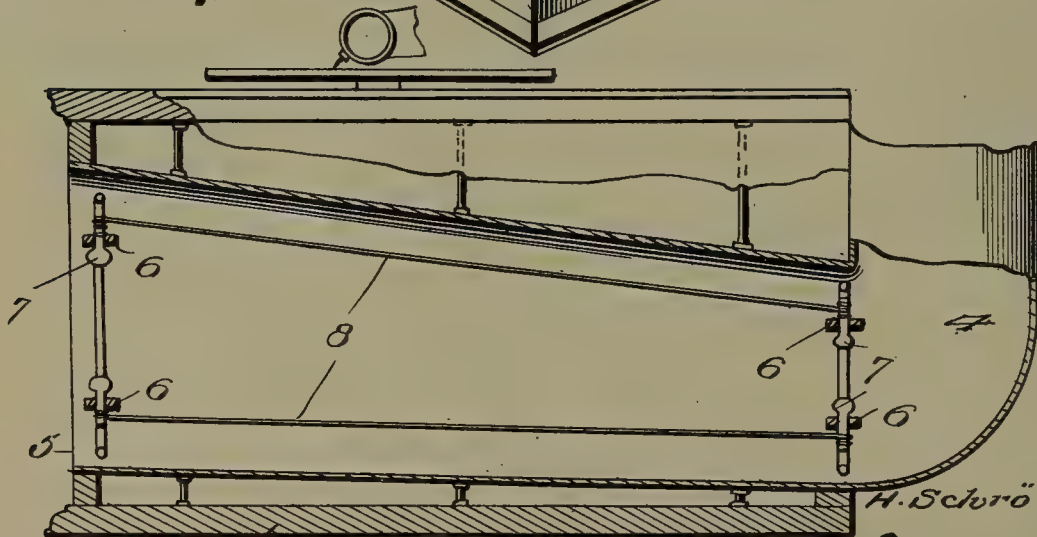


Fig. 2



Inventor

H. Schröder

Witnesses

W. K. Woodson.

Em. Ewan.

By

R. A. M. Kacy,

Attorneys

UNITED STATES PATENT OFFICE.

HERMANN SCHRÖDER, OF NEW YORK, N. Y.

PHONOGRAPH-HORN.

No. 890,534.

Specification of Letters Patent.

Patented June 9, 1908.

Original application filed March 2, 1907, Serial No. 360,158. Divided and this application filed May 4, 1907.
Serial No. 371,916.

To all whom it may concern:

Be it known that I, HERMANN SCHRÖDER, citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Phonograph-Horns, of which the following is a specification.

This invention contemplates certain new and useful improvements in phonographs and relates particularly to an improved construction of phonograph horn or megaphone which will result in reproducing a mellow sound without any of that metallic characteristic or tone quality which is such an objectionable incident of the ordinary metallic horn.

With this and other objects in view as will more fully appear as the description proceeds, the invention consists in certain constructions, arrangements and combinations of the parts which I shall hereinafter specifically describe and then point out the novel features in the appended claim.

In the accompanying drawings, I have illustrated my improved construction of phonograph horn as embodied in that type of phonographs where the sound amplifying means is mounted in a stationary manner within a casing or cabinet, upon which the disk or cylinder record is mounted.

In the drawings: Figure 1 is a perspective view of a phonograph embodying the improvements of my invention. Fig. 2 is a longitudinal sectional view.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

This application discloses an invention which has been divided out of a prior application for Letters Patent of the United States, #360,178, filed March 2, 1907, and the present invention relates solely to the construction of sound amplifying means or horns.

In the accompanying drawing I have shown for the purpose of illustration only, a cabinet or case 1 upon which a disk record 2 is mounted, 3 designating the taper arm

carrying the sound box or diaphragm and its stylus, and 4 designating the connection between the taper arm and the sound amplifying means mounted within the case.

My improved phonograph horn 5 is preferably composed of wood and is connected at one end of the case with the extension or connection 4 in any suitable manner, the said horn preferably extending entirely through the case 1 and tapered from its front towards its rear end and being elliptical in cross section. Upper and lower cross bars 6, preferably also of wood, extend across the horn 5 at the front and rear ends thereof, the ends of said cross bars being secured to the body of the horn in any desired manner, and a set of tuning pegs 7 is mounted in each of said bars 6. Strings 8 extend longitudinally of the body of the horn and have their ends secured in the well known way to the tuning pegs 7, said strings being the ordinary violin strings or strings of any other similar instrument. It is obvious that the strings 8 may be held at any desired degree of tension, and that in practical operation they will vibrate as the sound issues from the horn and produce a tone quality which will be mellow and without the objectionable metallic features so common with the ordinary phonograph horns.

Having thus described the invention, what is claimed as new is:

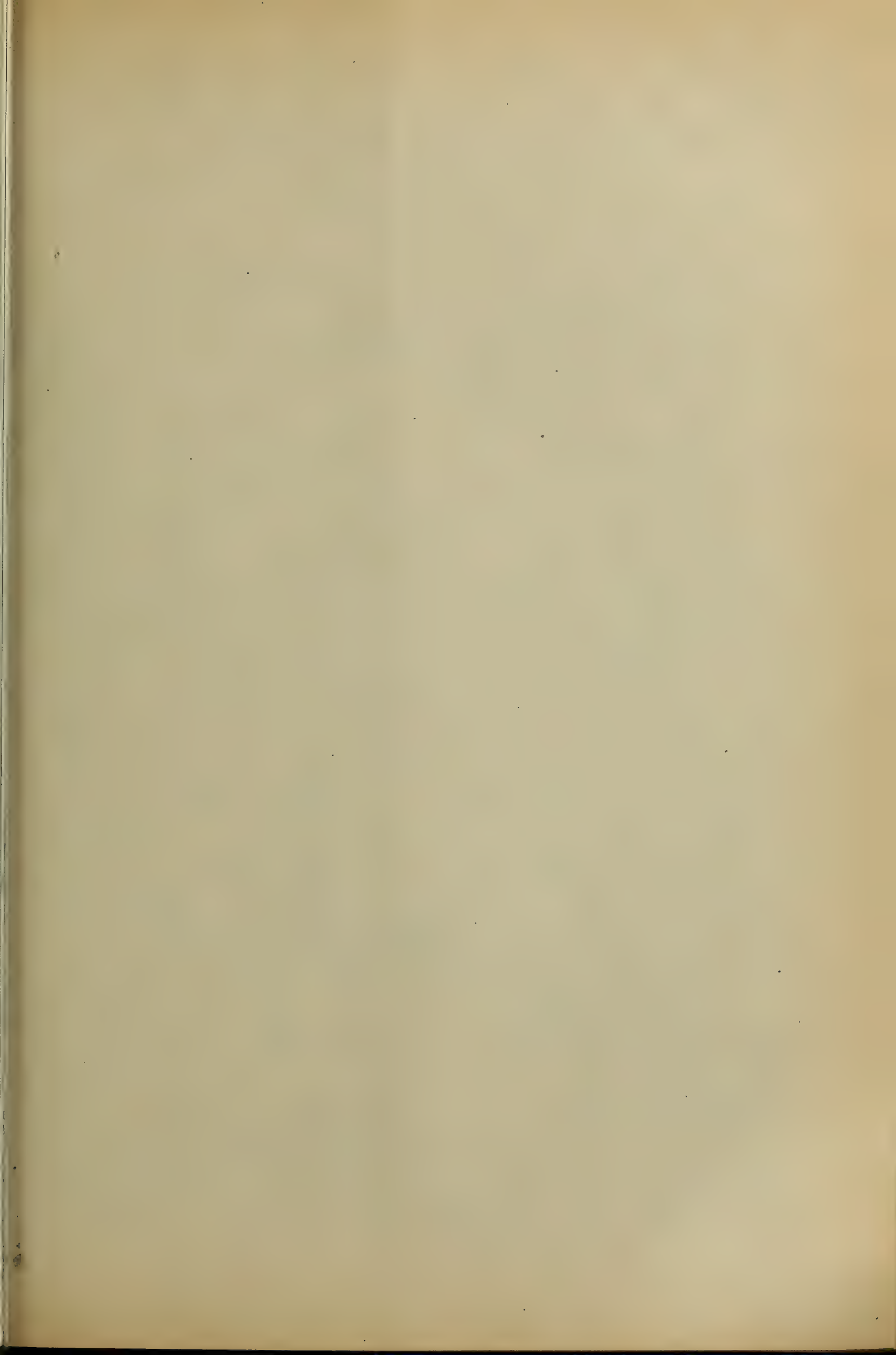
Sound amplifying and modifying means for phonographs, embodying a tapered body portion elliptical in cross section, upper and lower front and rear cross bars secured at their ends only within the said body portion and otherwise spaced from the walls thereof, tuning pegs mounted in said cross bars and strings secured to and stretched between the said pegs and extending longitudinally of the body portion.

In testimony whereof I affix my signature in presence of two witnesses.

HERMANN SCHRÖDER. [L. s.]

Witnesses:

MALWEISE VON DER OSTEN,
CORA WIESAND.



S. BERENS.

REGULATING DEVICE FOR GRAPHOPHONE SOUND BOXES.

APPLICATION FILED JAN. 8, 1908.

Fig. 1.

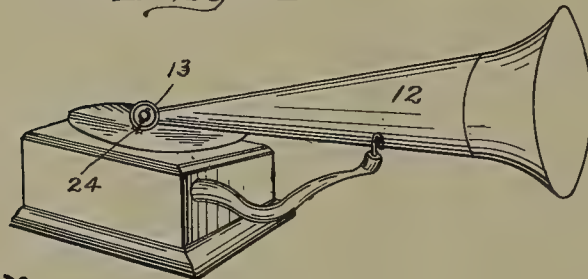


Fig. 5.

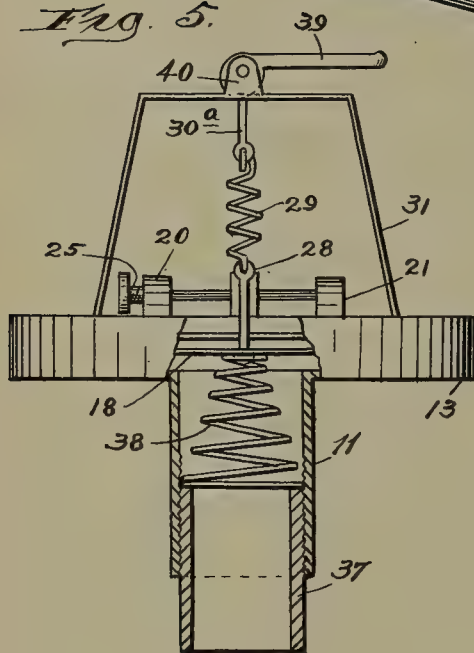


Fig. 2.

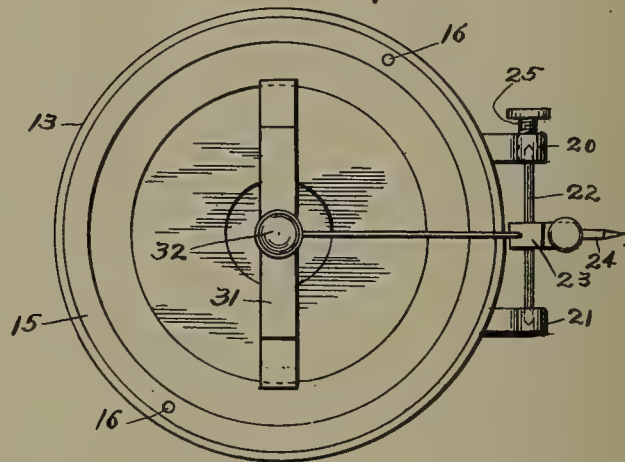


Fig. 3.

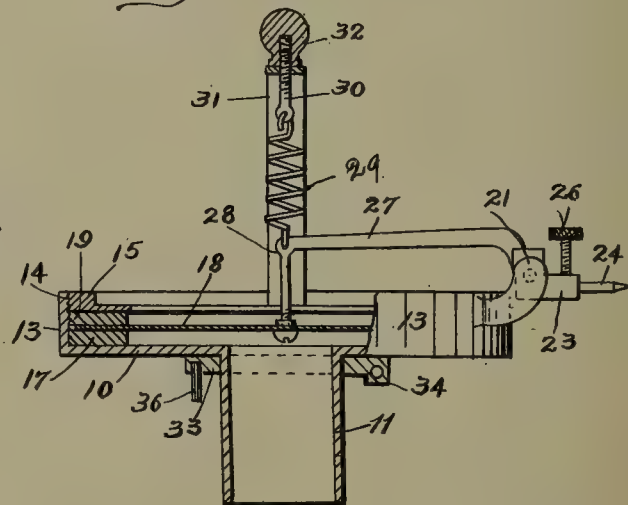
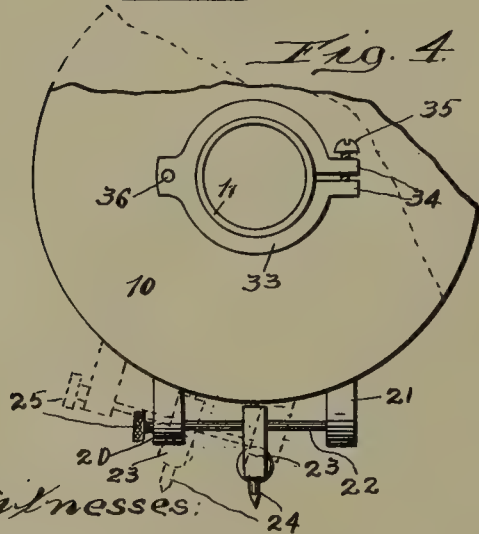


Fig. 4.



Witnesses:

Chas. E. Gorton.
M. A. Nymann.

Inventor:

Stanislaus Berens
By Chas. A. Gilman

UNITED STATES PATENT OFFICE.

STANISLAUS BERENS, OF LA GRANGE, ILLINOIS, ASSIGNOR OF ONE-FOURTH TO WILLIAM J. SOPER AND ONE-FOURTH TO PETER J. HISELMAN, BOTH OF CHICAGO, ILLINOIS.

REGULATING DEVICE FOR GRAPHOPHONE SOUND-BOXES.

No. 890,754.

Specification of Letters Patent.

Patented June 16, 1908.

Application filed January 8, 1908. Serial No. 409,868.

To all whom it may concern:

Be it known that I, STANISLAUS BERENS, a citizen of the United States, residing at La Grange, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in a Regulating Device for Graphophone Sound-Boxes, of which the following is a specification.

This invention relates to improvements in means for regulating or modulating the sounds of graphophones and analogous instruments, and has especial relation to the reproducers or sound-boxes of the same, and it consists in certain peculiarities of the construction, novel arrangement, and operation of the various parts thereof, as will be hereinafter more fully set forth and specifically claimed.

The principal object of the invention is to provide simple and efficient means to be used in connection with a graphophone sound-box whereby the vibration of parts thereof may be adjusted or regulated to the greatest degree of nicety, so as to produce as nearly as possible the natural and distinct articulations of spoken sounds, and to afford more perfect results in the reproduction of musical notes, as well as to prevent harsh, grating and discordant sounds.

A further object of the invention is to afford a greater degree of flexibility of the diaphragm while maintaining the proper tension thereof, so that the sounds and notes may be modified or softened.

Another object of the invention is to provide means to permit of the proper adjustment of the sound-box and stylus which it carries with respect to the record without interfering with the movement of the sound magnifying horn.

Other objects and advantages of the invention will be disclosed in the subjoined description and explanation.

In order to enable others skilled in the art to which my invention pertains, to make and use the same, I will now proceed to describe it, referring to the accompanying drawing, in which—

Figure 1 is a perspective view of a graphophone, showing a sound-box embodying my invention thereon and in position ready for operation; Fig. 2 is a face view of the outer surface of the sound-box; Fig. 3 is a plan view partly in section and partly in elevation, showing the means for regulating the tension

of the diaphragm and also the means for securing the same in position within the sound-box; Fig. 4 is a fragmental inner face view of the sound-box, showing by dotted lines one of the positions to which it and the stylus may be adjusted with respect to the record;—and—Fig. 5 is a plan view partly in section of the sound-box, showing a modification in its construction.

Like numerals of reference, refer to corresponding parts throughout the different views of the drawing.

The reference numeral 10 designates the frame-plate of the sound-box which is provided at its center with a sound receiving tube 11 on which the small end of the horn may be fitted. The frame-plate 10 of the sound-box is provided at its periphery with an annular flange 13 which projects outwardly or in the opposite direction from the tube 11 and has its inner surface partly screw-threaded as at 14 (see Fig. 3) to engage the outer screw-threaded surface of an annular washer 15, which is provided with a number of openings 16 for a spanner or other instrument to be used in turning the washer 15 when it is desired to screw the same in place.

Located on the inner surface of the frame-plate 10 of the sound-box, and at or near the periphery thereof, is a ring 17, of rubber or other suitable cushioning material, on which the diaphragm 18 rests near its periphery. On the outer surface of the diaphragm and at or near the flange 13 of the sound-box is another ring 19, of rubber or other suitable material, which is pressed against the diaphragm by means of the washer 15, thus securely holding the diaphragm in position within the sound-box frame, and in such a manner as to afford a great vibratory portion or area thereof, for it will be seen and understood that the rings 17 and 19 between which the diaphragm is interposed will contact with only a small portion of the diaphragm near its periphery. The flange 13 of the sound-box frame is provided on its outer surface with two spaced apart and transversely apertured arms 20 and 21 to receive the ends of a rod 22 on which the head 23 which carries the stylus 24 is mounted. The ends of the rod 22 are pointed, as shown in Fig. 2, to fit in conical-shaped openings in the arm 21 and in the inner end of an adjusting screw 25, which is in screw engagement with a suitable

opening in the arm 20. The stylus 24 is fitted in a suitable opening in the head 23, and may be adjustably held therein by means of a screw 26 which engages a suitable opening in the head.

Extending inwardly from the head 23 to the center of the diaphragm is the stylus-arm 27, which may be secured at its inner end to the center of the diaphragm in any suitable manner. As shown in Fig. 3, the stylus-arm 27 is formed with an elbow 28 to which is secured one end of a spiral spring 29, the other end of which is secured to the inner end of a screw 30 which is extended through a suitable opening in the middle portion of a bracket, of any suitable shape and construction, 31 which has its ends secured diametrically opposite each other to the washer 15, as will be understood by reference to Figs. 2, 3 and 5 of the drawings. On the outer portion of the screw 30 is a nut 32 used for regulating the tension of the spring 29, and through it and the stylus-rod the tension and flexibility of the diaphragm. Surrounding the tube 11 is a broken ring 33 which has on its ends outwardly extended lugs 34 in which is transversely located a screw 35 to be used for clamping the lugs together when it is desired to firmly secure the ring in position on the tube, or to permit the parts of the ring to spring apart when it is desired to adjust the sound-box and stylus, so that the latter may be arranged at the proper angle with respect to the record.

The ring 33 is provided at a point opposite the lugs 34 with a pin 36, which is adapted to fit in a suitable opening in the small end of the horn 12, or arm which, as is well known, is usually deflected at said end towards the sound-box and is fitted over the tube 11. By this arrangement it is evident that by loosening the screw 35 in the lugs 34 the sound-box may be turned to any suitable angle, as the ring 33 will loosely support the horn on the tube 11, when it may be again rigidly fixed thereto by tightening said screw.

In Fig. 5 of the drawing I have shown a modification in the construction of the device, which consists in providing the tube 11 with internal screw-threads to engage an adjusting tube 37 which is externally screw-threaded and is employed to regulate the tension of a conical-shaped spiral-spring 38, which has one of its ends secured to the diaphragm 18 and its other end resting against or in contact with the inner end of the tube 37, as is clearly shown in Fig. 5 of the drawing. This modified form further consists in employing a cam-lever 39 which is fulcrumed between two projections 40 on the middle outer portion of the bracket 31 and engages a rod 30^a, which is extended through an opening in the middle portion of the bracket 31 and has secured to its inner end one end of a spring 29, the other end of which is secured

to the elbow 28 of the stylus-arm as in the other construction.

While I have shown in Figs. 2 and 3 of the drawing a screw-rod 30 and nut 32 for regulating the tension of the spring 29, and have shown in Fig. 5 the rod 30^a and cam-lever 39 for said purposes, yet it is evident that I may employ a screw-rod and nut on the construction shown in Fig. 5, or may employ a cam-lever and rod in the construction shown in Figs. 2 and 3, without departing from the spirit of the invention.

From the above description of my improvements it will be seen that the improved sound-box constructed according to my invention is of an extremely simple and inexpensive nature, and is especially well adapted for use by reason of the great accuracy or nicety with which the tension of the diaphragm may be regulated without deleteriously affecting its flexibility, and, of the fact that the sound-box and stylus may be easily adjusted to any desired position with respect to the record without interfering with or causing the movement of the horn. And, it will also be evident that the device is susceptible of considerable modification without material departure from the principles and spirit of the invention, and for this reason I do not desire to be understood as limiting myself to the precise form and arrangement of the several parts of the device as herein set forth in carrying out my invention in practice, for example, the adjusting tube 37 and spring 38 shown in Fig. 5 may or may not be used in conjunction with the spring 29 and adjusting means therefor shown in Figs. 2 and 3 of the drawing.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters-Patent, is—

1. The combination with a graphophone sound-box, of a bracket mounted across one of its faces, a stylus-arm pivotally mounted on the box and in engagement with the diaphragm, a spiral-spring connected at one of its ends to the inner portion of the stylus-arm and movably connected at its other end to the bracket, and means to regulate the tension of the spring.

2. The combination with a graphophone sound-box, of a bracket mounted across one of its faces, a stylus-arm pivotally mounted on the box and in engagement with the diaphragm, a screw-rod extended through the bracket at about its middle, a spiral-spring connected at one of its ends to the inner portion of the stylus-arm and at its other end to one end of the screw-rod, and an adjusting nut on the other end of said rod.

3. The combination with a graphophone sound-box having a sound-receiving-tube on one of its faces and provided on its other face with a diametrically disposed bracket, of a stylus-arm pivotally mounted on the box

and in engagement with the diaphragm, a spiral-spring connected at one of its ends to the inner portion of the stylus-arm and movably connected at its other end to the bracket,
 5 a spiral-spring located in the tube and in engagement with the diaphragm, and means to regulate the tension of said springs.

4. The combination with a graphophone sound-box having a sound-receiving-tube on
 10 one of its faces and provided on its other face with a diametrically disposed bracket, of a stylus-arm pivotally mounted on the box and in engagement with the diaphragm, a spiral-spring connected at one of its ends to
 15 the inner portion of the stylus-arm and movably connected at its other end to the bracket, means to regulate the tension of said spring, a spiral-spring located in the tube and in engagement at one of its ends with the dia-
 20 phragm, and another tube adjustably secured in the sound-receiving-tube to regulate the tension of the spring in said tube.

5. The combination with a graphophone sound-box having a sound-receiving-tube on
 25 one of its faces and provided on its other face with a diametrically disposed bracket, of a broken ring detachably secured on said tube and having a projection near its periphery, a stylus-arm pivotally mounted on the box
 30 and in engagement with the diaphragm, a spiral-spring connected at one of its ends to the inner portion of the stylus-arm, and means at the other end of said spring to adjust its tension.

6. The combination with a graphophone 35 sound-box having a sound-receiving-tube on one of its faces, of a diaphragm secured in the box, means to regulate the flexibility of the diaphragm, and a broken ring detachably secured on the tube and provided with a pro- 40 jection near its periphery.

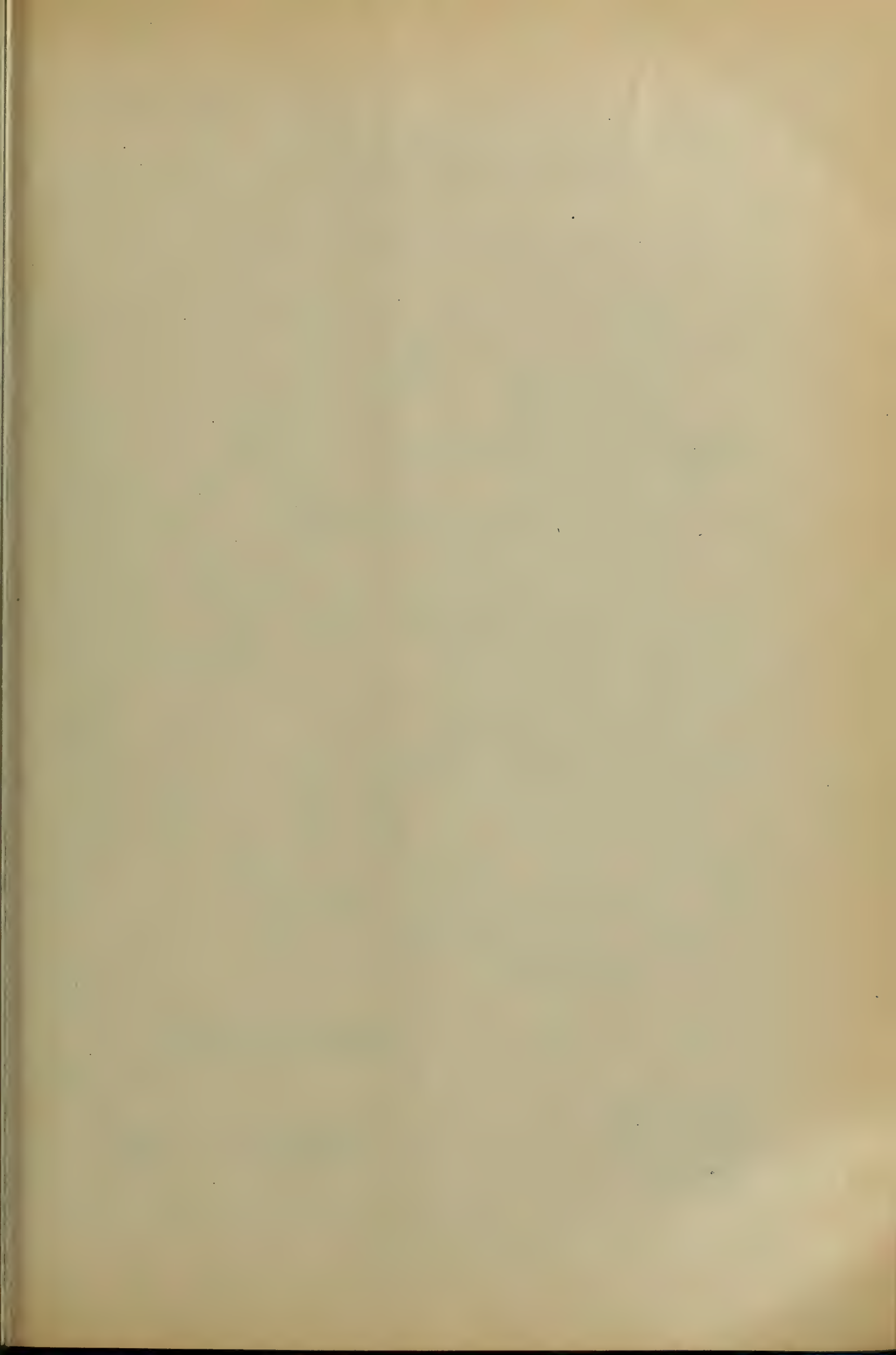
7. The combination with a graphophone sound-box having a sound-receiving-tube on one of its faces, of a diaphragm secured with-
 45 in the sound-box, a spiral-spring located within the tube and in engagement at one of its ends with the diaphragm, and an adjusting tube adjustably secured within the sound receiving-tube to regulate the tension of said
 50 spring.

8. The combination with a graphophone sound-box consisting of a frame-plate provided with an internally screw-threaded annular flange, of a pair of rings located on the
 55 plate within the flange thereof, a diaphragm interposed between said rings, a washer in screw engagement with the flange of the frame-plate, a stylus-arm pivotally mounted on the box and in engagement with the dia-
 60 phragm, a spiral-spring connected at one of its ends to the inner portion of the stylus-arm, and means at the other end of said spring to support the same and adjust its tension.

STANISLAUS BERENS.

Witnesses:

CHAS. C. TILLMAN,
 M. A. NYMAN.



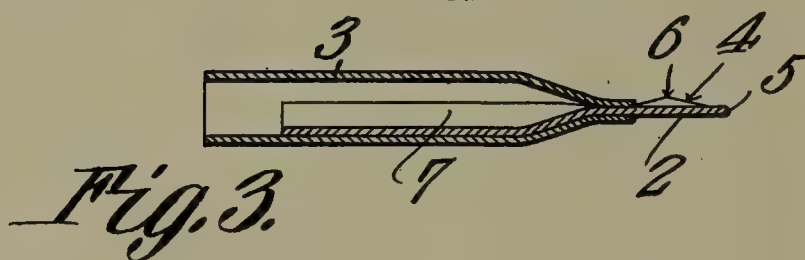
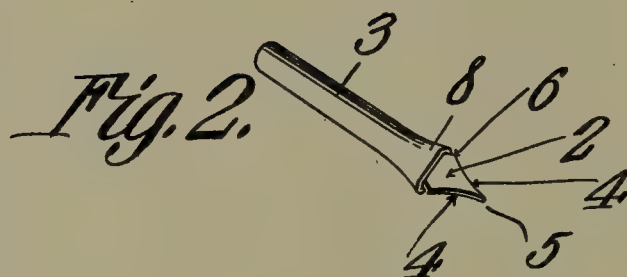
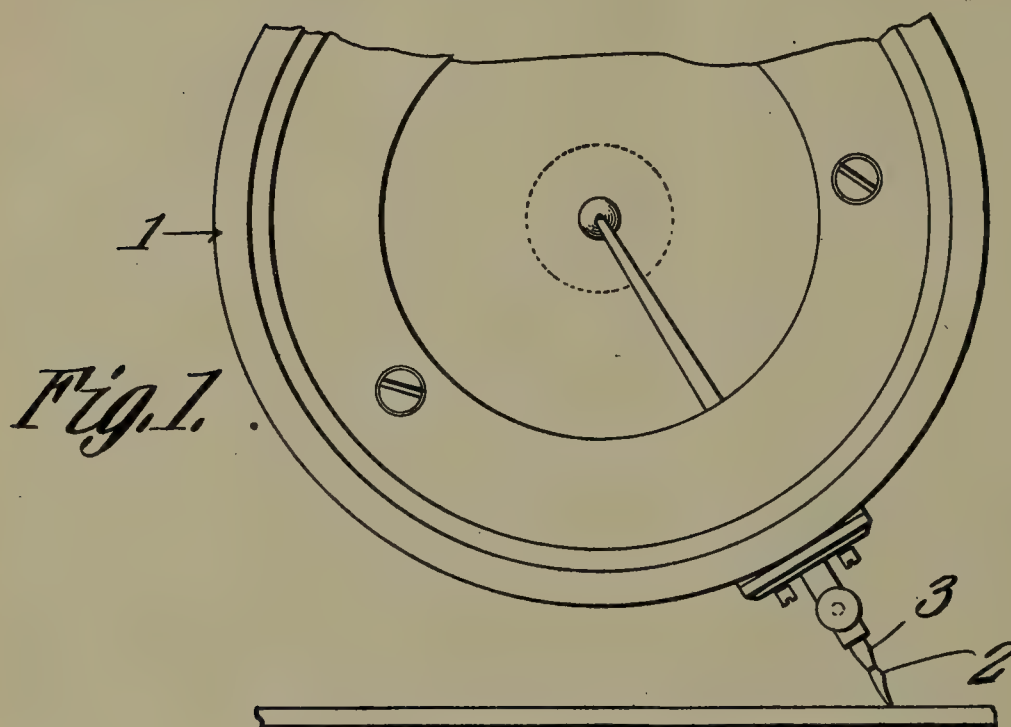
No. 890,777.

PATENTED JUNE 16, 1908.

S. LEVIN.

STYLUS FOR SOUND REPRODUCING MACHINES.

APPLICATION FILED NOV. 18, 1907.



Samuel Levin
Inventor

Witnesses

E. J. Stewart
F. J. Chapman

By

C. A. Snow & Co.
Attorneys

UNITED STATES PATENT OFFICE.

SAMUEL LEVIN, OF HIGHLAND PARK, ILLINOIS.

STYLUS FOR SOUND-REPRODUCING MACHINES.

No. 890,777.

Specification of Letters Patent.

Patented June 16, 1908.

Application filed November 16, 1907. Serial No. 402,491.

To all whom it may concern:

Be it known that I, SAMUEL LEVIN, a citizen of the United States, residing at Highland Park, in the county of Lake and State of Illinois, have invented a new and useful Stylus for Sound-Reproducing Machines, of which the following is a specification.

This invention has reference to improvements in the reproducing point or stylus for sound-reproducing machines, and its object is to provide a stylus which will give a mellow and soft-toned reproduction, more particularly from flat or disk-shaped records wherein the sound record is represented by a sinuous groove of even depth.

The present invention is an improvement upon the invention disclosed in my application #361,122, for stylus for sound-reproducing machines filed March 7, 1907. In the said application, the stylus is made of a thin piece of horny, homogeneous material, such as quill, with one end bent into a cylinder of a size to fit the stylus holding socket of a sound box, while the other end is flat, thin and tapering and is adapted to engage in the sound record groove.

The present invention utilizes the same material for the record groove engaging point, while the body or shank of the stylus is made of metal or other rigid material closely embracing the quill and extending comparatively close to the operating point thereof. This metallic shank is made cylindrical through the greater portion of its length to fit the socket in the end of the stylus lever and at the free end the shank is flattened to conform to the flattened end of the working point of the stylus, and also to operate to transmit the vibrations imparted to the stylus point with less loss of amplitude than occurs with an all-quill stylus.

The invention will be best understood from the following detail description, taken in connection with the accompanying drawing forming part of this specification, in which drawing,

Figure 1 is a side elevation, upon an enlarged scale, of a portion of the sound-reproducing sound box with the improved stylus in place therein. Fig. 2 is a perspective view of the improved stylus upon a larger scale than is shown in Fig. 1. Fig. 3 is a longitudinal section of the stylus upon a still larger scale.

Referring to the drawings, there is shown a sound box 1 which may be of any desired construction such as is used in connection with sound-reproducing machines using flat disk records, and no special description of such sound box is necessary, since, in itself, it forms no part of the present invention.

The stylus is formed of two parts, 2, 3. The part 2 is composed of a piece of horny, homogeneous, hard material, such as a thin piece of horn, or goose quill, celluloid, or some such substance. One end of the part 2 is spread out into a nearly flat shape with the sides 4 approaching each other until they finally emerge into a point 5 of such size as to enter the sound record groove of the well-known sound disk records. Back of the wide portion 6 of the stylus point or head the quill may be continued a distance, as indicated at 7. The part 3 of the stylus, which may be termed the shank of the stylus, is formed of a metallic tube of cylindrical shape of such external diameter as to fit snugly but easily into the usual stylus receiving socket of the stylus carrying lever of the sound box. This shank extends onto the part 2 as near to the operating end 5 thereof as may be found practicable. In the drawing, the metal tube 3 is shown as reaching to a point just back of the widest portion 6 of the part 2, but it is within the scope of the invention to extend the metal tube still closer to the working end 5. In order that the tube 3 may grasp the part 2 closely about the flat portion thereof, that end of the tube contiguous to the working point of the part 2 is flattened, as shown at 8, so as to grasp the working point 2 both on the sides and ends in order that there may be no lost motion between the parts 2 and 3. The extent of projection of the part 7 into the tube 3 is immaterial and may be much less than that shown, as long as the parts 2 and 3 are firmly united and the part 2 is prevented from any movement in, or independent of, the part 3.

By making the part 3 of sufficient rigidity, and by allowing the part 2 to project but little beyond the outer end of the part 3, there is produced a stylus having a rigid, unyielding shank with an operating point or end for engaging the sound groove which will have no wearing or other injurious effects upon the walls of the groove, and therefore the life of the record tablets is indefinitely

prolonged. Furthermore, the harsh, grating noises, so obtrusive when all-metal stylus points are used, are practically eliminated.

The present invention retains all the advantages of the structure set forth in my aforesaid application, while adding thereto the additional advantage of a stiff and unyielding shank for the stylus. The structure of the aforesaid application is well adapted for the so-called "soft tone" reproductions of sound records, but where louder and more brilliant reproductions are desired, the stylus made entirely of quill or like material fails to produce the desired brilliancy and loudness of reproduction. This is due to the elasticity of the material used and the consequent absorption of a material proportion of the amplitude of vibration imparted by the groove to the stylus before the vibrations reach the stylus carrying lever. The metal sleeve, however, is much less elastic than the horny substance employed and, consequently, there is little, if any, loss of amplitude of vibration between the sound record groove and the stylus carrying lever. The result is that the brilliancy and loudness of the reproduced sound is practically equal to the reproduction through an all-metal stylus used for loud-toned reproductions, while the harsh, grating, extraneous noises are practically eliminated and the wear of the stylus upon

the walls of the record groove is inappreciable.

I claim:—

1. A stylus for sound-reproducing machines composed of a sound-groove-engaging portion consisting of a thin piece of horny, homogeneous material having one end approximately flat with the sides approaching and merging into a sound-groove-engaging point, and a shank composed of a cylinder of metal-receiving the end of the piece of horny material remote from the point thereof and flattened down upon said horny material. 35 40

2. A stylus for sound-reproducing machines composed of a thin piece of quill pointed at one end to engage a sound record groove, and a cylindrical shank piece, of metal, receiving the other end of the quill and flattened to engage the same. 45 50

3. A stylus for sound-reproducing machines having a sound record groove-engaging point of horny homogeneous material and a shank portion of another material of more rigid character than the point portion. 55

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

SAMUEL LEVIN

Witnesses:

HERBERT MOON,
CHARLES F. GRANT.

T. KRAEMER.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED JULY 16, 1907.

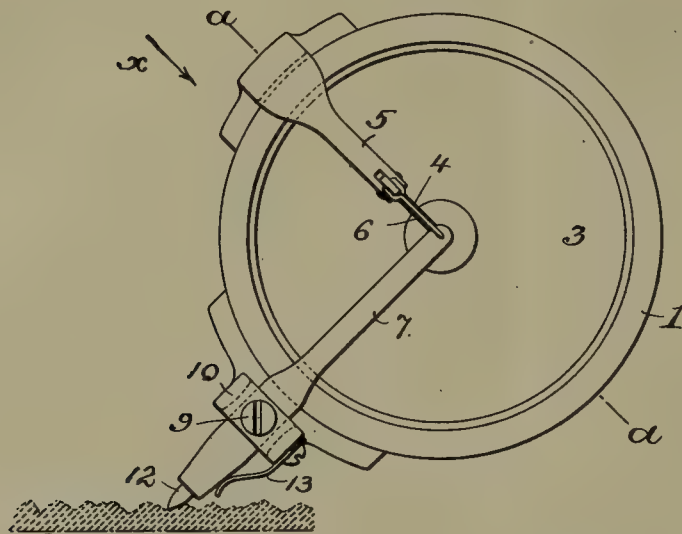


Fig. 1.

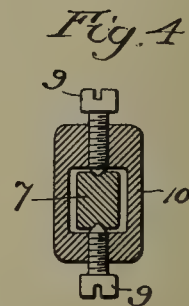


Fig. 4.

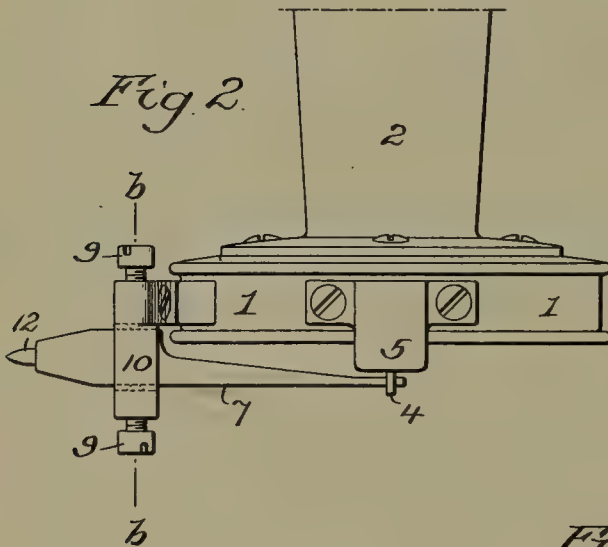


Fig. 2.

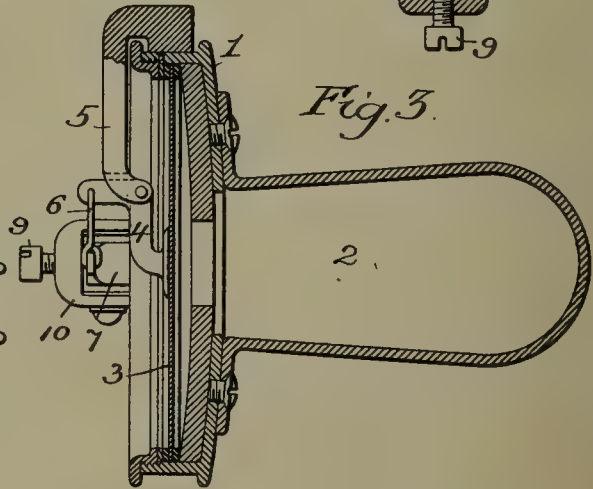
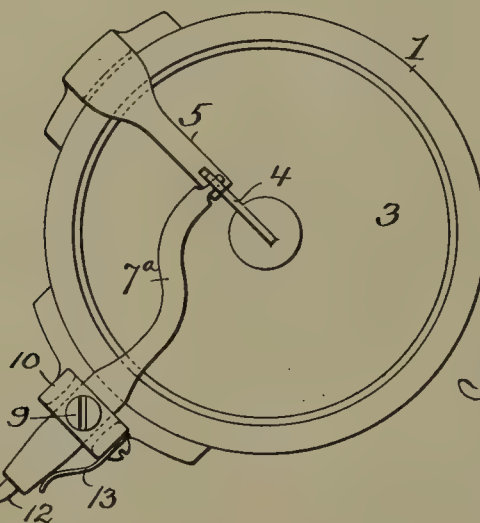


Fig. 3.

Fig. 5.



Witnesses

Harry L. Smith
Kate A. Beadle

Inventor
Thomas Kraemer
By his Attorneys
Smith & Frazier

UNITED STATES PATENT OFFICE.

THOMAS KRAEMER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

SOUND-BOX FOR TALKING-MACHINES.

No. 891,079.

Specification of Letters Patent.

Patented June 16, 1908.

Application filed July 15, 1907. Serial No. 383,721.

To all whom it may concern:

Be it known that I, THOMAS KRAEMER, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain
5 Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

The object of my invention is to adapt for use in connection with a phonograph record
10 of the "hill and valley" type, a sound box of the character usually employed in connection with records of the "lateral wave" type. This object I attain in the manner hereinafter set forth, reference being had to the accompanying
15 drawing, in which

Figure 1 is a face view of a sound box constructed in accordance with my present invention; Fig. 2 is an elevation of the same looking in the direction of the arrow *x*, Fig. 1; Fig. 3 is a section on the line *a—*a**, Fig. 1; Fig. 4 is a section on the line *b—*b**, Fig. 1, and Fig. 5 is a view similar to Fig. 1, but illustrating a slight modification of the invention.

The cylindrical casing 1 of the sound box
25 is mounted upon the hollow arm 2 as usual, and has supported within it, in the ordinary way, the diaphragm 3, the central portion of this diaphragm being secured to one arm of a bell crank lever 4 which is pivoted to an over-
30 hanging bracket 5, secured to the casing 1, the other arm of said lever 4 being connected, by a link 6, to one arm of the stylus lever 7, the latter being pivotally mounted upon the pointed ends of screws 9 which are carried by
35 opposite members of a yoke 10 secured to the casing 1, of the sound box. (See Figs. 2 and 4). The other arm of said stylus lever carries the stylus 12 which engages the groove of the record as shown in Fig. 1, so that, as the
40 record travels beneath said stylus, the stylus lever is caused to vibrate by reason of the "hill and valley" conformation of the base of the groove, these vibrations being in the same plane as that of the diaphragm 3; but
45 being transformed by the bell crank lever 4 into vibrations at a right angle to the plane of the diaphragm, thereby causing vibrations of the latter corresponding to the vibrations of the stylus lever. A spring 13 secured to the yoke 10 and bearing upon the
50 stylus lever serves to maintain constant contact of the lever connections and of the bell crank lever and diaphragm.

Instead of using a link connection between the two levers as shown in Fig. 3, I may, in
55 some cases, cause the stylus lever to engage directly with the bell crank lever 4, as shown, for instance, in Fig. 5, the stylus lever 7^a being suitably bent or deflected for this purpose.

By reason of my invention, a sound box of
60 the type usually employed in connection with records having "lateral wave" grooves is readily adapted for use in connection with records having grooves of the "hill and valley" type.
65

I claim:—

1. The combination of a sound box, a vertically disposed diaphragm therein, a bearing fixed to said sound box, a bell crank lever attached to said diaphragm and pivotally
70 mounted in said bearing to vibrate at a right angle to the plane of the diaphragm, another bearing fixed to said sound box and carrying pivots extending parallel with the axis of the sound box and diaphragm, and a stylus lever
75 carried by said pivots and connected to said bell crank lever to vibrate in a plane at a right angle to the axis of the sound box and diaphragm.

2. The combination of a sound box, a vertically disposed diaphragm therein, a bearing fixed to said sound box and projecting over the diaphragm, a bell crank lever attached to said diaphragm and pivotally
80 mounted in said projecting bearing to vibrate at a right angle to the plane of the diaphragm, another bearing fixed to said sound box and carrying pivots extending parallel with the axis of the sound box and diaphragm, and a stylus lever carried by said pivots and connected to said bell crank lever to vibrate vertically in a plane at a right angle to the axis of the sound box and diaphragm.
85

3. The combination of a sound box, a vertically disposed diaphragm therein, a bearing fixed to said sound box, a bell crank lever attached to said diaphragm and pivotally
90 mounted in said bearing to vibrate at a right angle to the plane of the diaphragm, another bearing fixed to said sound box and carrying pivots extending parallel with the axis of the sound box and diaphragm, a stylus lever carried by said pivots and connected to said bell crank lever to vibrate vertically in a plane at a right angle to the axis of the sound
95 box and diaphragm, and a spring carried by
105

the bearing to which the stylus lever is pivoted, said spring acting upon the stylus lever to lift the same from the groove of the record.

4. The combination of a sound box, a ver-
5 tically disposed diaphragm therein, a bear-
ing fixed to said sound box, a bell crank lever
attached to said diaphragm and pivotally
mounted in said bearing to vibrate at a right
angle to the plane of the diaphragm, another
10 bearing fixed to said sound box and provided
with adjustable screw pivots extending par-
allel with the axis of the sound box and dia-
phragm, and a stylus lever mounted upon
said pivots and connected to said bell crank
15 lever to vibrate vertically in a plane at a
right angle to the axis of the sound box and
diaphragm.

5. The combination of a sound box, a ver-
tically disposed diaphragm therein, a bearing
20 fixed to said sound box and projecting over

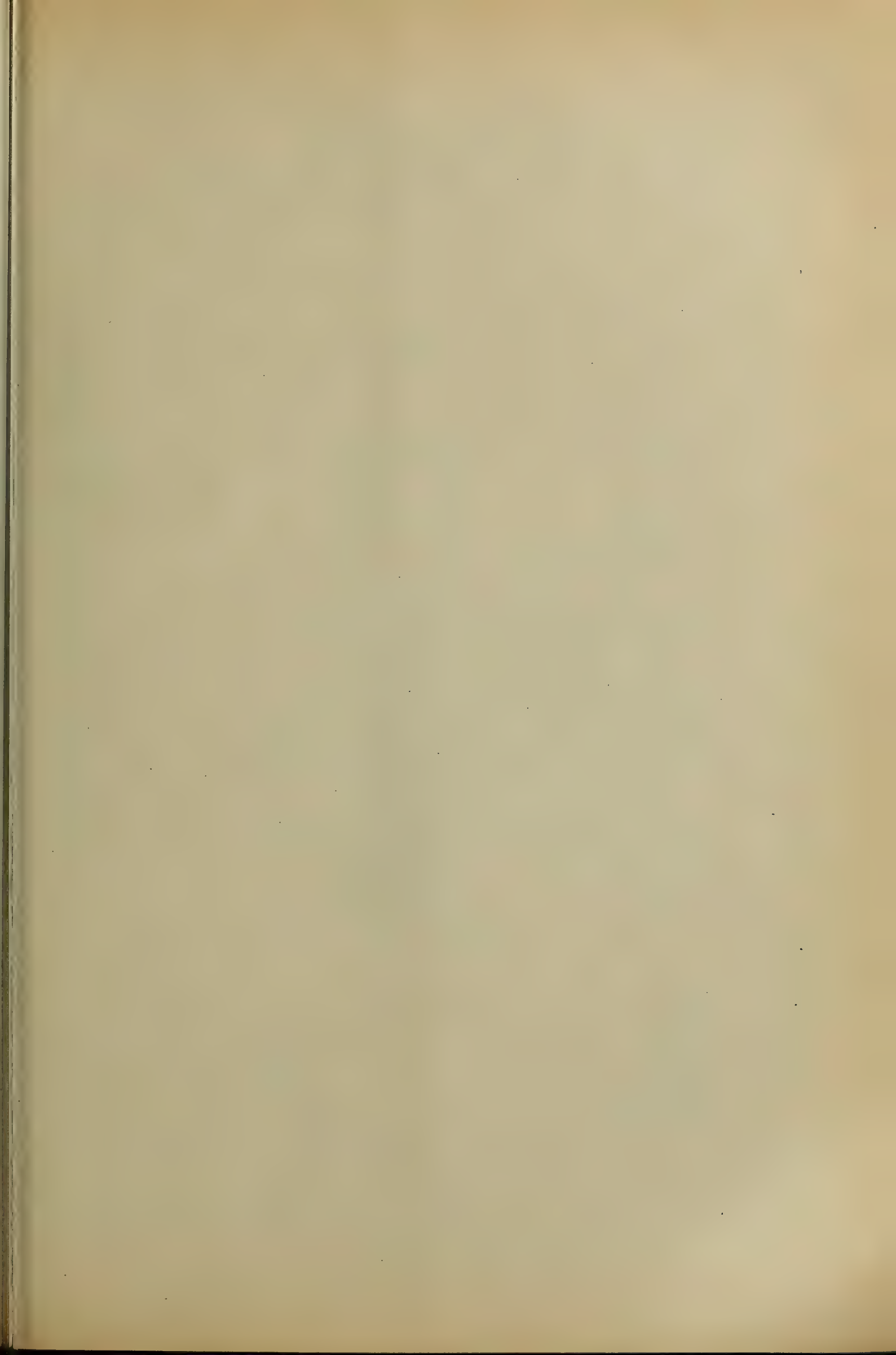
said diaphragm, a bell crank lever attached
to said diaphragm and pivotally mounted in
said projecting bearing to vibrate at a right
angle to the plane of the diaphragm, another
bearing fixed to the sound box and provided 25
with adjustable screw pivots extending par-
allel with the axis of the sound box and dia-
phragm, and a stylus lever mounted upon
said pivots and connected to said bell crank
lever to vibrate vertically in a plane at a 30
right angle to the axis of the sound box and
diaphragm.

In testimony whereof I have signed my
name to this specification, in the presence
of two subscribing witnesses.

THOMAS KRAEMER.

Witnesses:

HAMILTON D. TURNER,
KATE A. BEADLE.



No. 891,196.

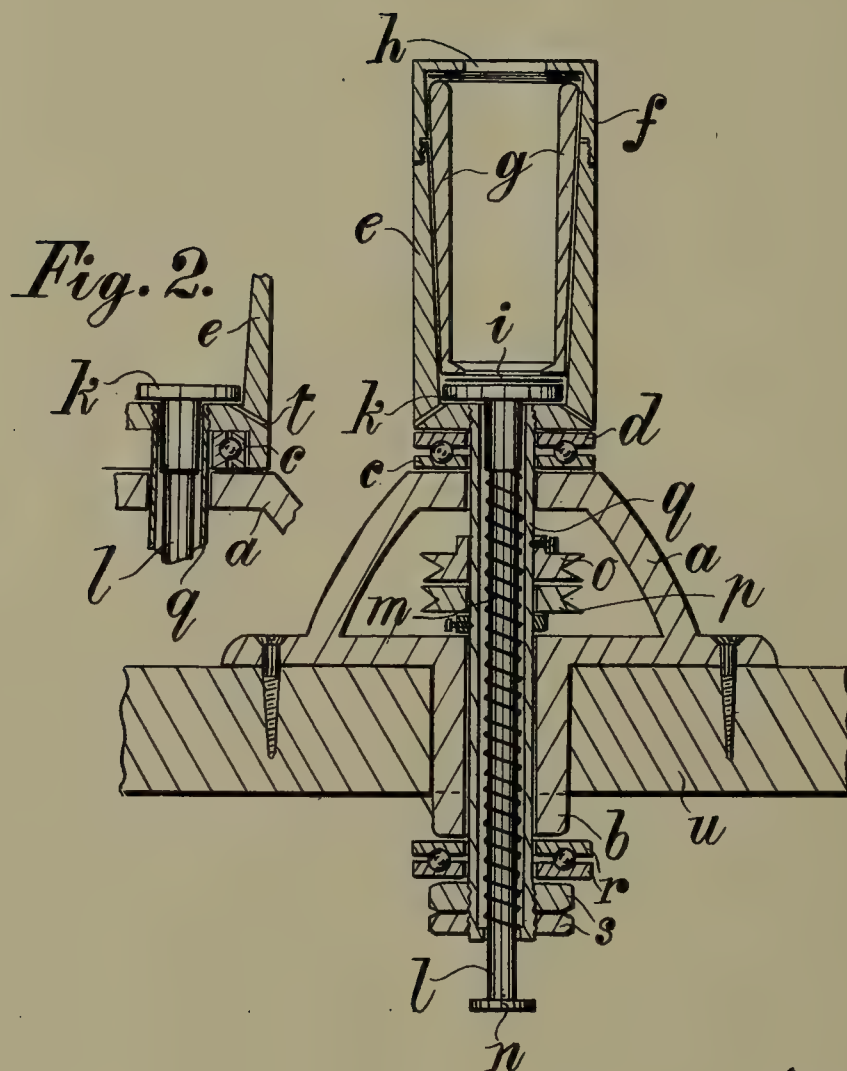
PATENTED JUNE 16, 1908.

E. TRAYNOR, S. BURGESS & J. AMES.

MECHANISM FOR THE MANUFACTURE OF CYLINDRICAL BLANKS AND
RECORDS FOR PHONOGRAPHS, GRAPHOPHONES, AND THE LIKE.

APPLICATION FILED FEB. 24, 1908.

Fig. 1.



Witnesses:
L. E. Barkley
L. A. Sands.

Inventors:
Edward Traynor,
Stephen Burgess, and
John Ames.

by *Frank Appleman*
att'y.

UNITED STATES PATENT OFFICE.

EDWARD TRAYNOR AND STEPHEN BURGESS, OF LEYTONSTONE, AND JOHN AMES, OF LEYTON, ENGLAND.

MECHANISM FOR THE MANUFACTURE OF CYLINDRICAL BLANKS AND RECORDS FOR PHONOGRAPHS, GRAPHOPHONES, AND THE LIKE.

No. 891,196.

Specification of Letters Patent.

Patented June 16, 1908.

Application filed February 24, 1908. Serial No. 417,477.

To all whom it may concern:

Be it known that we, EDWARD TRAYNOR and STEPHEN BURGESS, residents of 89 Mel-ford road, Leytonstone, Essex, England, 5 electrochemical engineers, and JOHN AMES, factory manager, of 3 Ashville road, Leyton, Essex, England, all citizens of the United Kingdom of Great Britain and Ireland, have invented a certain new and useful Improved 10 Mechanism for the Manufacture of Cylindrical Blanks and Records for Phonographs, Graphophones, and the Like, of which the following is a specification, such as will enable others skilled in the art to which it 15 appertains to make and use the same.

Our invention consists in an apparatus for spinning cylindrical blanks and records for phonographs, graphophones and other sound recording and sound reproducing instru- 20 ments by the use of centrifugal force, and has for its object the prevention of spiral lines, splashes, holes and other faults.

In this apparatus a shell is used, tapered in such a manner as to conveniently accommo- 25 date and center the mold or matrix and also to prevent the vibration which invariably produces faulty blanks and records and is either screwed or clutched on to the base and furnished with a perforated annular top, or it 30 is permanently attached to the base and fitted with a perforated cap held in position by a clutch or screw or in any other convenient manner.

With the foregoing and other objects in 35 view, the invention consists in the details of construction and in the arrangement and combination of parts to be hereinafter more fully set forth and claimed.

In describing the invention in detail, ref- 40 erence will be had to the accompanying drawings forming part of this specification wherein like characters denote correspond- ing parts in the several views, in which—

Figure 1, shows a sectional elevation of our 45 device; and Fig. 2, shows a view of a plat- form *k*, with the ball race in vertical position.

In these drawings, *a*, is a fixed support with a tubular socket *b*. A ball race *c*, is ap- 50 plied to the top of the support *a*, and forms a cover for the ball race. The shell *e*, is pro- vided with an annular cap *f*, having a hole in its center. A mold or matrix *g*, is applied to the interior of the shell and the perforated

disk *h*, is interposed between the cap and the mold or matrix. Below the mold or matrix 55 *g*, we place a disk *i*, forming a temporary bottom for the mold or matrix. A circular platform *k*, is secured to the end of a rod *l*, and the rod is encircled by a spring *m*, which serves to lift the platform when the cap *f*, is 60 removed. The rod *l*, is provided with an enlargement *n*, on its end which is designed to abut the hollow spindle *q*, said hollow spindle having a fixed pulley *o*, and a loose pulley *p*, thereon. The shell *e*, is also se- 65 cured to the upper end of the hollow spindle so that the said shell is rotated as the hollow spindle is rotated.

r, is a lower ball race and *s*, *s*, are adjusting 70 nuts.

u, is a bench or table through which the tubular socket *b*, forming an extension of the support *a*, projects, and *t*, *t*, are air vents in the walls of the shell.

The method of using the device is obvious. 75 The matrix being inserted, the hot wax is poured in while the shell and matrix are rapidly rotating. As soon as the wax is properly set, the cap and top disk are removed, when the platform rises and the matrix or mold can 80 be withdrawn without injury to the record or blank.

We are aware that it has already been pro- posed to make records by pouring molten wax into a rapidly revolving mold and we do not 85 claim this principle broadly but only the im- proved means of carrying same out, includ- ing the top and bottom disks, the rising plat- form for removing the mold and the general mounting of the device. 90

We claim

1. A mechanical device for producing blanks and records for phonographs, grapho- phones and the like, consisting of a support, a shell, a mold within the shell, a disk at the 95 top of the mold, a disk at the bottom of the mold, a cap for the mold, a platform, a hol- low spindle for rotating the shell, a rod in the spindle adapted to project the mold, and a spring for holding the rod normally projected. 100

2. A mechanical device for producing blank and records for phonographs, grapho- phones and the like, consisting of a support, a shell, a mold within the shell, a hollow spin- dle connected to the shell, a rod slidable in 105 the hollow spindle and having its end enter-

ing the shell, a spring for holding the rod normally projected, and means for rotating the hollow spindle.

3. A mechanical device for producing
5 blank and records for phonographs, graphophones and the like, consisting of a support, a shell rotatable thereon, a hollow spindle depending from the shell through the support, means for rotating the hollow spindle, a rod
10 slidable in the hollow spindle adapted to enter the shell, and a spring encircling the rod and normally projecting the same.

4. A mechanical device for producing blank and records for phonographs, grapho-

phones and the like consisting of a hollow 15 shell, means for rotating the shell, a mold within the shell, an apertured disk at the top of the mold, a disk at the bottom of the mold, and a cap for the mold.

In witness whereof we have hereunto set 20 our hands in presence of two witnesses.

EDWARD TRAYNOR.
STEPHEN BURGESS.
JOHN AMES.

Witnesses:

HENRY FAIRBROTHER,
JOHN ALDRIDGE.

No. 891,356.

PATENTED JUNE 23, 1908.

E. H. MOBLEY.

TURN TABLE FOR GRAMOPHONE MACHINES.

APPLICATION FILED OCT. 12, 1906.

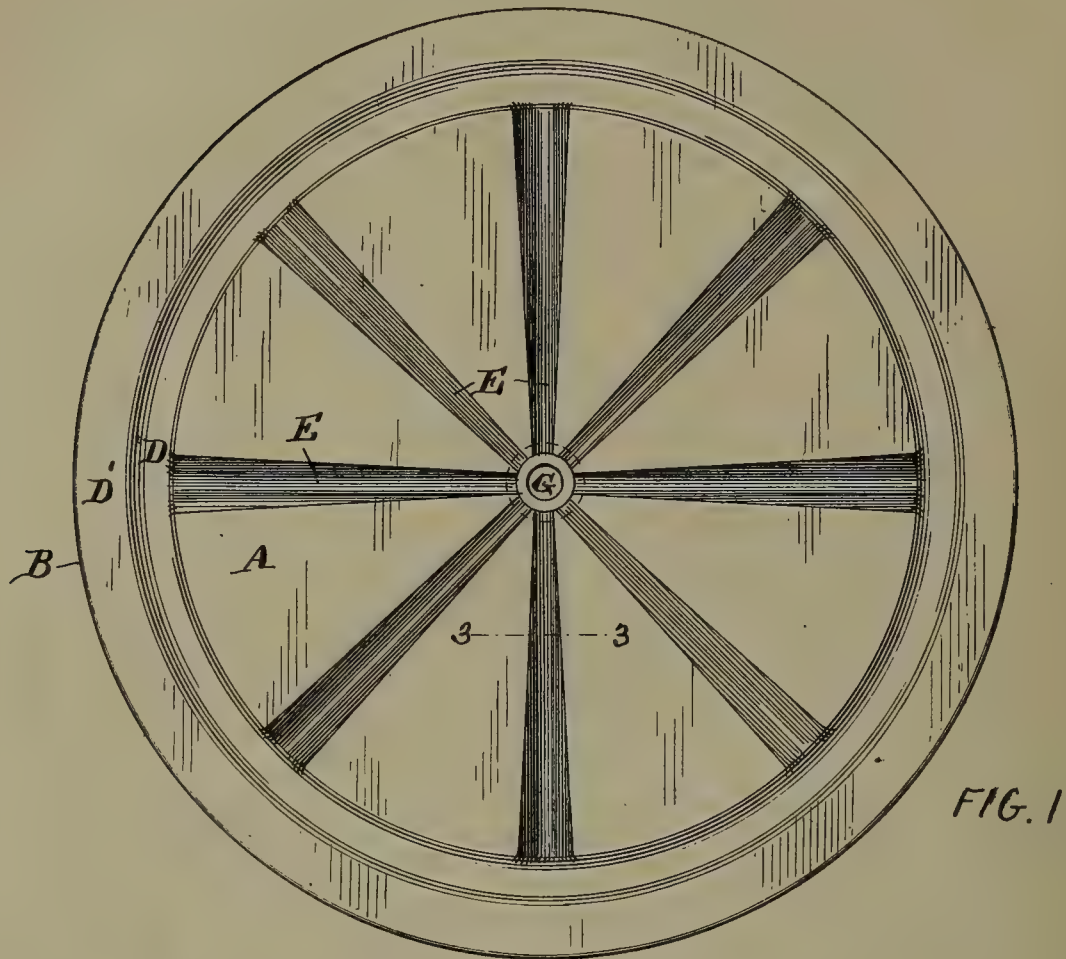


FIG. 1

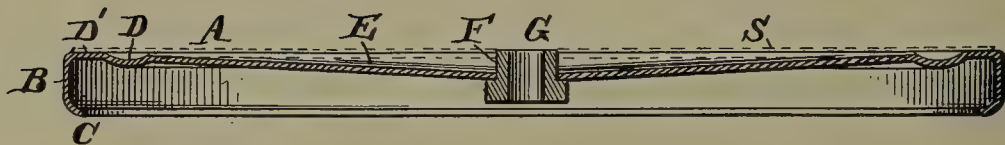


FIG. 2

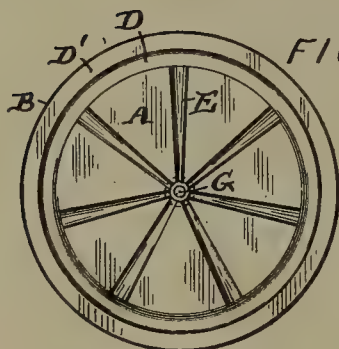


FIG. 5



FIG. 3

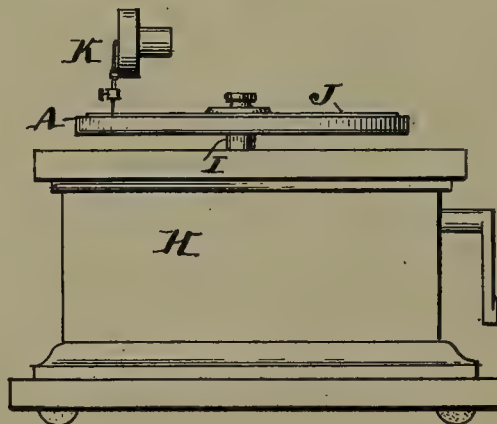


FIG. 4

Attest
W. F. Linscott
A. M. Kelly

Inventor
Edwin H. Mobley
By his atty

W. F. Linscott

UNITED STATES PATENT OFFICE.

EDWIN H. MOBLEY, OF HILLSIDE, PENNSYLVANIA.

TURN-TABLE FOR GRAMOPHONE-MACHINES.

No. 891,356.

Specification of Letters Patent.

Patented June 23, 1908.

Application filed October 12, 1906. Serial No. 338,536.

To all whom it may concern:

Be it known that I, EDWIN H. MOBLEY, of Hillside, Montgomery county, State of Pennsylvania, have invented an Improvement in Turn-Tables for Gramophone-Machines, of which the following is a specification.

My invention has reference to turntable for gramophone machines and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings which form a part thereof.

The object of my invention is to provide a construction of turntable for talking machines which shall embody accuracy of rotation, lightness, and cheapness of manufacture.

Heretofore, the turntables of sound reproducing machines of the gramophone type have been made heavy and of cast iron. The castings frequently warp and give an irregular surface for the reception of the sound record tablet and cause a very uneven travel of the same. This is injurious, in that the stylus is made to seriously affect the form of the grooves because of the greater duty thus put upon it. The heavy weight of the turntable required more spring power to rotate it, and the turntable as a whole was needlessly costly.

My invention overcomes the objections inherent to the heavy cast iron turntables above pointed out. Being light, my improved turntable gets up its speed of rotation more quickly at starting to produce the proper rate of vibration to secure the articulation of sound desired and yet, when the pressure of the sound box and connections are transmitted to it through the stylus and record tablet, the "drag," thus obtained, insures its speed remaining steady.

My invention consists of the turntable of the motor part of a gramophone instrument when made of sheet metal shaped to maintain a flat condition upon its upper surface which acts as a support for the record disk.

More specifically, my invention comprehends the sheet metal turntable provided with a downwardly extending flange on its outer edge, an annular groove or downwardly extending rib near its outer edge and preferably a series of radial downwardly extending ribs, said ribs radiating from the neighborhood of the hub.

My invention also embodies details of construction which, together with the features

above specified, will be better understood by reference to the drawings, in which:

Figure 1 is a plan view of my improved turntable; Fig. 2 is a transverse section of the same; Fig. 3 is a cross section on line 3—3 of Fig. 1; Fig. 4 is an elevation of a portion of a gramophone instrument with my improved turntable applied, and Fig. 5 is a plan view of a modification.

A is the disk turntable and is made of metal preferably circular in form, stamped into shape to brace it in all directions and at the same time present a flat surface on top for reception of the record disk. The disk has its outer edge flanged downward as at B and the free edge is preferably turned inward as at C. This adds strength and also shields the rough edge of the metal from view.

Near the outer flanged edge of the disk and in the upper surface thereof there is an annular depression D which, while shallow, acts to hold the plate in a flat condition.

The surface of the plate between the outer edge and the annular groove D forms a flat band portion D'.

The central portion of the disk is formed with a hole and also a series of radial grooves E preferably extending from the hub G to the annular groove D. I prefer to have the grooves deeper near the hub than at the outer portion of the disk so that they form downwardly extending ribs on the under side which are deeper adjacent to the hub to give great strength and also to have the grooves widened as they approach the groove D.

G is the hub and may be in the form of a flanged bushing.

The ribs E give depth to the disk adjacent to the center and being close together at this place act excellently to support the bushing.

The turntable thus formed has a series of triangular portions and a circular portion surrounding them, all of which are in the same plane and held in such plane by the flange B and parts D, E. The turntable is then covered with felt or other textile material as at S for the reception of the record tablet, and this covering may be cemented or otherwise attached. This turntable is fitted upon the upright spindle I of the motor H. K represents the sound box and stylus and J is the record tablet supported on the turntable, in Fig. 4.

The outer edge may be stretched by making the flange B in other shapes, such as is

well known in metal working so that in using the term "flange" I do not wish to be understood as confining myself to the identical form shown.

- 5 I have shown my improved turntable of the form I prefer, but I wish it to be understood that the ribs E may be dispensed with or modified as to length and width without departing from the spirit of my invention.
10 It is also evident that while I prefer the edge C to be bent inward, as shown, this may be omitted.

Having now described my invention what I claim as new and desire to secure by Letters Patent, is:

- 15 1. A turntable for a talking machine, which consists of a disk of sheet metal having its outer edge provided with a downwardly extending flange, and its upper surface provided with an annular depressed portion near the outer edge forming an annular flat band portion.

- 20 2. A turntable for a talking machine, which consists of a disk of sheet metal having its outer edge provided with a downwardly extending flange, and its upper surface provided with an annular depressed portion near the outer edge forming an annular flat band portion, and a series of depressed portions extending from the central part toward the annular depressed portion and forming ribs on the underside.

- 25 3. A turntable for a talking machine, which consists of a disk of sheet metal having its outer edge provided with a downwardly extending flange, and its upper surface provided with an annular depressed portion near the outer edge forming an annular flat band portion, and a series of depressed portions extending from the central part toward the annular depressed portion and forming ribs on the underside, said ribs increasing in width as they approach said annular depressed portion.

- 30 4. A turntable for a talking machine,

which consists of a disk of sheet metal having its outer edge provided with a downwardly extending flange, and its upper surface provided with an annular depressed portion near the outer edge forming an annular flat band portion, and a series of radially arranged depressed portions extending from the center outward forming ribs upon the outer side, and a central bushing forming a hub for the support of the turntable.

- 55 5. A turntable for talking machines made of sheet metal in disk form and having a flange B at its outer edge said flange having the inwardly curved lower edge C, and also an annular depression D in its upper surface near its outer edge so as to form an annular surface D' adjacent to the outer edge.

- 60 6. A turntable for talking machines made of sheet metal in disk form and having a flange B at its outer edge and a series of radial depressed portions extending from the center outward.

- 70 7. A turntable for talking machines made of sheet metal in disk form and having a flange B at its outer edge and a series of radial depressed portions extending from the center outward, and forming downwardly extending ribs upon the underside, said ribs having greatest depth near the center of the disk and ribs to form a hub.

- 75 8. A turntable for talking machines consisting of a disk of sheet metal having its outer edge downwardly flanged and its upper surface provided with depressed portions to give it strength, combined with a covering of yielding material cemented to the surface of the disk and bridging the depressed portions thereof.

In testimony of which invention, I have hereunto set my hand.

EDWIN H. MOBLEY.

Witnesses:

ERNEST HOWARD HUNTER,
R. M. KELLY.

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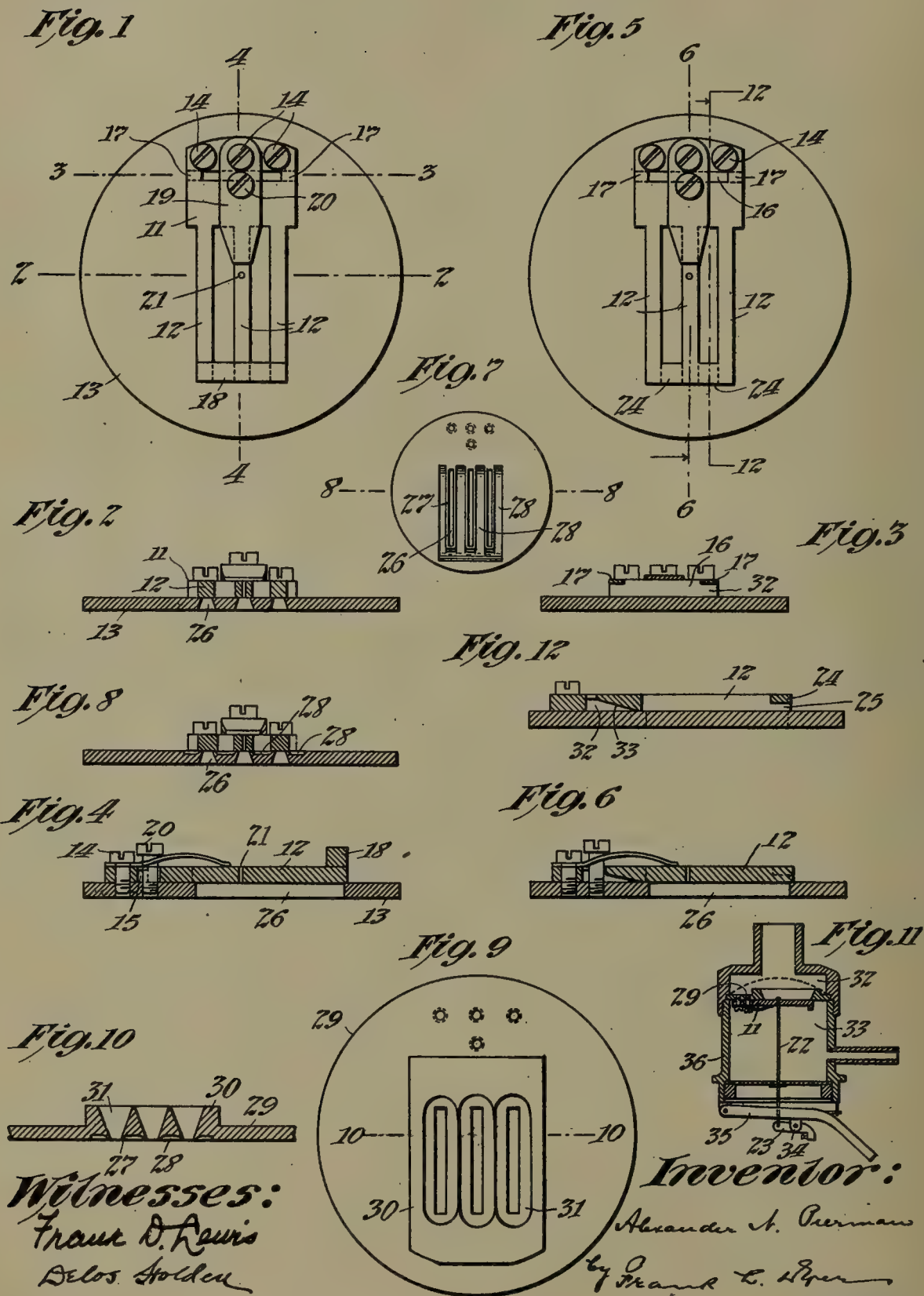
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No. 891,367.

PATENTED JUNE 23, 1908.

A. N. PIERMAN.
SOUND REPRODUCER.
APPLICATION FILED FEB. 2, 1907.



Witnesses:
Frank D. Lewis
Delos Holden

Inventor:
Alexander N. Pierman
by Frank E. Lewis
Atty.

UNITED STATES PATENT OFFICE.

ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOUND-REPRODUCER.

No. 891,367.

Specification of Letters Patent.

Patented June 23, 1908.

Application filed February 2, 1907. Serial No. 355,388.

To all whom it may concern:

Be it known that I, ALEXANDER N. PIERMAN, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Sound-Reproducers, of which the following is a description.

My invention relates to sound reproducers of the general type disclosed and claimed in my applications Serial No. 288,837, filed November 24, 1905 and Serial No. 307,324, filed March 22, 1906, and has for its object the provision of means whereby improved results will be secured.

My invention consists of an improved form of valve for varying the rate of flow of elastic fluid through the ports which communicate with the resonating chamber, and an improved form of port for coöperating with the valve referred to, as will be hereinafter pointed out and claimed.

Reference is hereby made to the accompanying drawing of which

Figure 1 is a bottom plan view of a port plate to which one form of valve is applied; Figs. 2, 3 and 4 are sections upon lines 2—2, 3—3 and 4—4 respectively of Fig. 1; Fig. 5 is a bottom plan view of a port plate provided with a modified form of valve; Fig. 6 is a section on line 6—6 of Fig. 5; Fig. 7 is a bottom plan on a smaller scale of a port plate adapted to be used with either of the valves illustrated or with any other valve which is adapted to vary the flow of elastic fluid through the ports in accordance with the vibrations of sound waves; Fig. 8 is an enlarged section on line 8—8 of Fig. 7 with a valve seated upon the ports thereof; Fig. 9 is a plan view of a modified form of port plate; Fig. 10 is a section on line 10—10 of Fig. 9; Fig. 11 is a vertical section of a phonographic sound reproducer showing the relative locations of the ported plate, valve, resonating chamber, stylus, etc., and Fig. 12 is a section on line 12—12 of Fig. 5.

Referring to Fig. 1, the improved valve comprises a plate 11, the greater portion of whose length is slotted to form parallel tongues 12, the number of which corresponds with the number of ports with which the valve is to coöperate. I have obtained favorable results by the use of valves having three tongues of the relative proportions illustrated. The valve 11 when in use will

be secured to a port plate 13 in any suitable manner, as by means of screws 14 passing through openings in the plate 11 and threaded in the plate 13. The plate 11 is weakened along a line adjacent the screws 14 by being cut away to form a transverse groove 15. The bottom of this groove is cut out throughout its intermediate portion as shown at 16, (Figs. 1, 2 and 3) so as to leave two thin narrow tongues 17 as the only connection between the main body of the plate 11 and that portion which is held by the screws 14. Secured to the free ends of the tongues 12 is a transverse bar or bridge 18 which serves to bind the tongues together and prevent torsional movements thereof. It also keeps the valve plate flat and prevents separate or individual vibrations of the tongues. The plate 11 and bar 18 are preferably made of aluminum and are cemented together by shellac or other suitable material. A flat spring 19 is secured at one end to the plate 11 by the middle screw 14 and presses with its free end upon the middle tongue 12. The point of contact of the free end of the spring may be either at the point shown in the drawing or the spring may be prolonged so as to rest upon that portion of the tongue 12 which is at the point of greatest pressure of the air stream which passes through the ports, or it may even extend close to the free end of the tongue 12. This spring 19 is centered with respect to the tongue 12 and the tension of the spring regulated by the adjusting screw 20. The tongue 12 is shown as having a pin hole 21 for receiving the link 22 which connects the tongue 12 with the stylus lever 23.

The valve shown in Figs. 5 and 6 is somewhat similar to that of Figs. 1 to 4, but differs therefrom in the shape of the transverse groove 15. In the valve of Fig. 5 the metal is cut away immediately at the base of the tongues 12, see Fig. 12, so as to form a groove 32 with a sloping wall 33 which extends close to the ends of the ports through which the elastic fluid passes. By this means the flow of the fluid is facilitated and there is much less chance for dirt to find lodgment between the valve and part plate so as to hold the valve permanently open. In the valve of Fig. 5, the bar 18 is dispensed with and the tongues 12 are connected by integral bridge members 24 which are flush with the outer surface thereof but whose depth is less

than that of said tongues so as to provide spaces 25 for the escape of air passing through the ports 26. The port plate 13 of Figs. 1 to 6 is a flat plate having ports 26 cut there-
 5 through and the tongues 12 of the valve 11 rest upon the flat surface of the plate 13 adjacent the edges of the ports 26. With this construction the flow of air depends upon the width of the tongue 12 as regards the port 26,
 10 that is, if the width of the tongue 12 is increased, other conditions being unchanged, the flow of air will be diminished; and also if the tongue 12 is not accurately centered with respect to the port 26 so that the over-
 15 lap or bearing surface of the tongue is greater at one side of the port than the other, there will be an unequal flow of elastic fluid at the opposite sides of said tongue because more air will escape from the side where
 20 there is the smaller amount of overlap. Such irregularities in flow produce defects in the sound reproduction.

Another reason why inaccurate centering of the tongues 12 produces defects in repro-
 25 duction is because when the valve moves from an open to or toward a closed position the air between the tongues 12 and plate 13 acts as a cushion and in case the tongues are not properly centered, there will be a greater
 30 cushioning effect on one side than on the other which will tend to tilt or twist the tongue laterally and thereby prevent it from closing the port. It is therefore highly im-
 35 portant, in constructing a sound reproducer with this type of valve plate, to use the greatest accuracy as to the width of the tongues 12 and slots 26 and as to the center-
 40 ing of the said tongues with respect to the said slots. In order to avoid the necessity for the extreme accuracy referred to, I prefer to cut away the portions of the ported plate
 45 which surround the ports 26, as shown in Figs. 7, 8 and 10, thus forming knife edges 27 surrounding each of the ports 26, upon which
 50 edges the tongues 12 are adapted to lie. These knife edges may be either sharp or slightly flattened. The cut away portions of the plate 13 form channels 28 for the escape of the elastic fluid passing through the ports
 26. It will be obvious that with this construction the flow of fluid through the ports
 26 will be independent of the width or centering of the tongues 12.

In the plate of Figs. 9 and 10 the central
 55 portion 30 is of increased thickness and the ports 31, having walls which converge towards their lower edges, form a series of funnels of considerable depth and with their upper edges in immediate juxtaposition.
 60 These funnels amplify the sounds produced by the variations in flow of elastic fluid there-
 through. The lower surface of the plate 29 is shown as being cut away to form channels 28 and knife edges 27 similar to those of Figs.
 65 7 and 8.

Fig. 11 shows the preferred arrangement of parts, when my invention is used for phonographic reproduction, although it is obviously capable of being applied to other classes of sound reproducers such as telephone
 70 receivers, etc. The port plate 29 is situated between a resonating chamber 32 and an equalizing chamber 33 in which the valve plate 11 is located, the same being operated by a link 22 connected with the stylus lever
 75 23 whose pivot 34 is carried by the floating weight 35 which is pivoted to the body 36.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is as follows:

1. In a sound reproducer, a valve consist-
 80 ing of a plate weakened along a line of flexure by a groove the bottom of which is cut through along part of its length, substantially as set forth.

2. In a sound reproducer, a valve consist-
 85 ing of a plate of elastic material formed with parallel tongues and a transverse groove which forms a line of flexure, substantially as set forth.

3. In a sound reproducer, a valve consist-
 90 ing of a plate formed with tongues and a bridge across the ends thereof remote from the point of support of the plate, substantially as set forth.

4. In a sound reproducer, a flat plate pro-
 95 vided with a port, the surface of said plate being cut away and sharpened adjacent the edges of said port to form knife edges, substantially as set forth.

5. In a sound reproducer, the combina-
 100 tion of a flat plate provided with a set of ports the edges of which project to form knife edges and a valve consisting of a plate formed with tongues, said tongues resting
 105 against said knife edges to vary the extent of opening of said ports, substantially as set forth.

6. In a sound reproducer, a member pro-
 110 vided with a set of funnel shaped ports, and means for varying the flow of elastic fluid therethrough, substantially as set forth.

7. In a sound reproducer, a plate formed with funnel shaped ports, the edges of which are in immediate juxtaposition, substantially
 115 as set forth.

8. In a sound reproducer, the combina-
 120 tion of a body formed with resonating and equalizing chambers and ports connecting said chambers, said ports being formed with walls which converge from the resonating
 chamber toward the equalizing chamber, forming funnels of greater depth than width, substantially as set forth.

9. In a sound reproducer, the combina-
 125 tion of a plate having a port and a valve therefor consisting of a plate weakened along a line of flexure by a groove, said groove extending close to the edge of said port, sub-
 130 stantially as set forth.

10. In a sound reproducer, a valve consisting of a plate formed with tongues and a transverse groove which forms a line of flexure, said groove extending to the base of said
5 tongues, substantially as set forth.

11. In a sound reproducer, a valve consisting of a plate formed with tongues and a transverse groove which forms a line of flexure, said groove extending to the base of

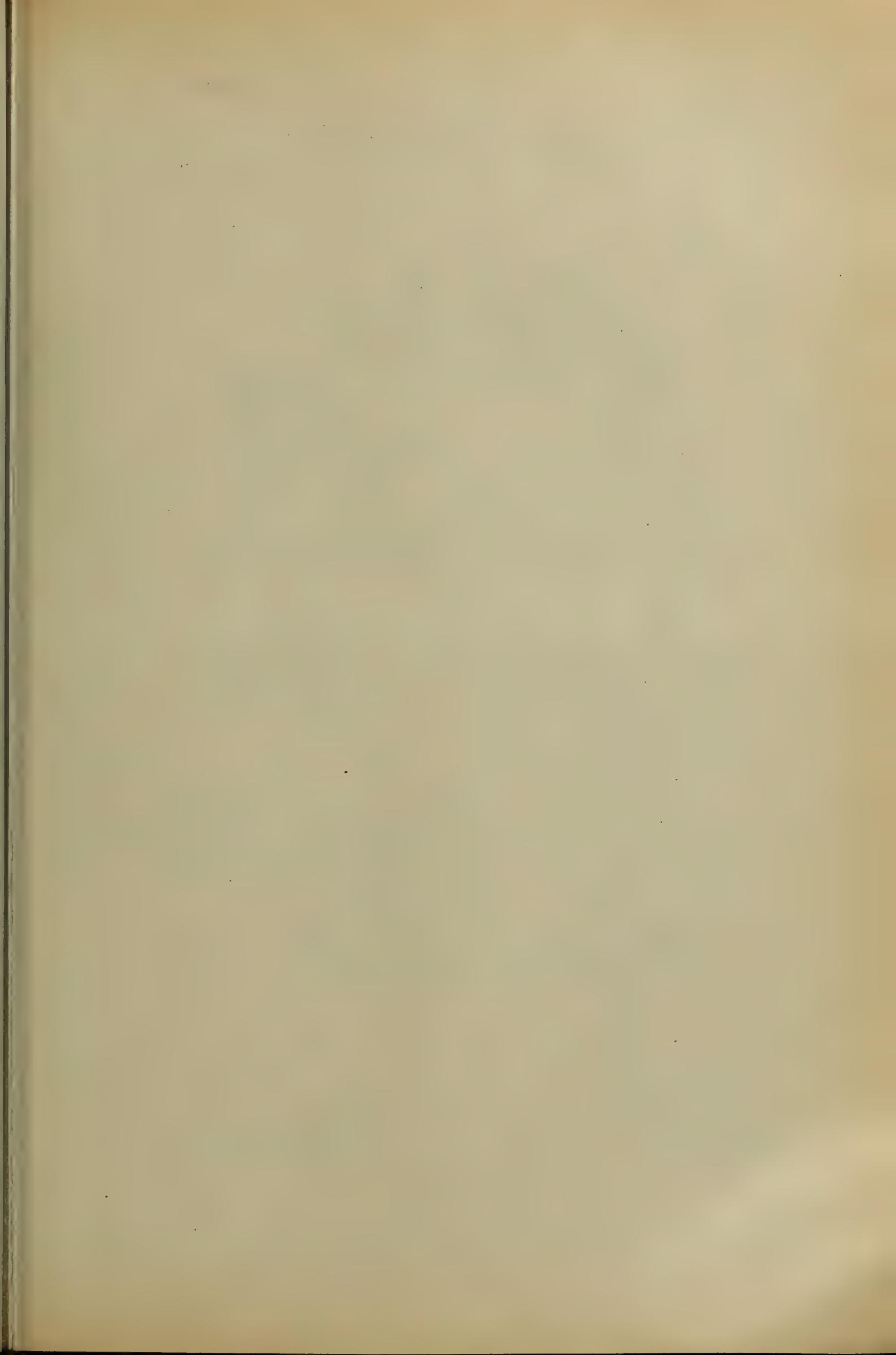
said tongues and increasing gradually in 10 depth as it leaves said tongues, substantially as set forth.

This specification signed and witnessed this 1st day of February 1907.

ALEXANDER N. PIERMAN.

Witnesses:

DELOS HOLDEN,
FRANK D. LEWIS.



H. SCHRÖDER.
FEED MECHANISM FOR PHONOGRAPHS.
APPLICATION FILED OCT. 17, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

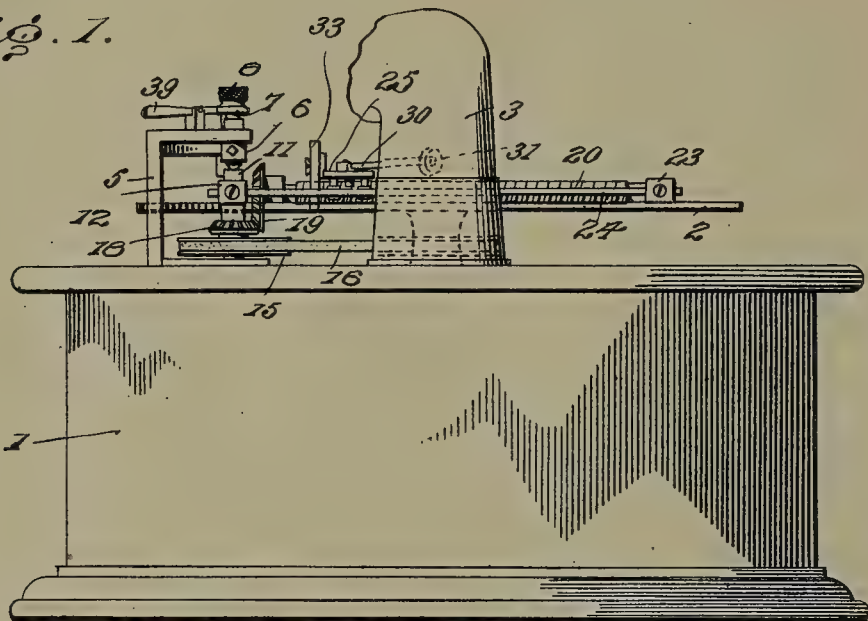


Fig. 3.

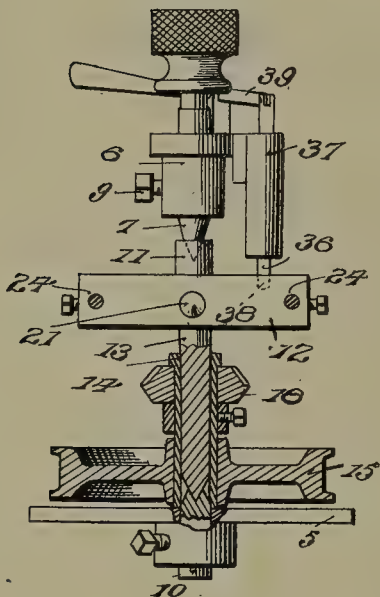


Fig. 5.

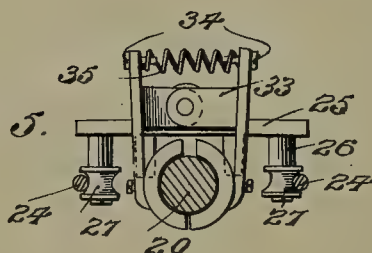
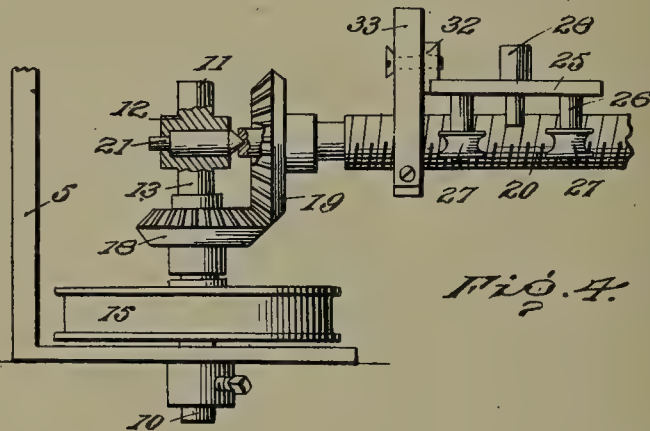


Fig. 4.



Inventor

H. Schröder

Witnesses

W. H. Murray

W. P. Woodson

By

Th. H. Macy, Attorneys

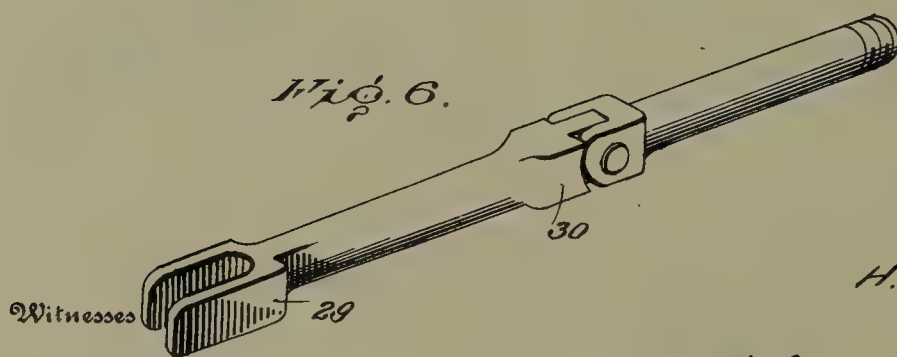
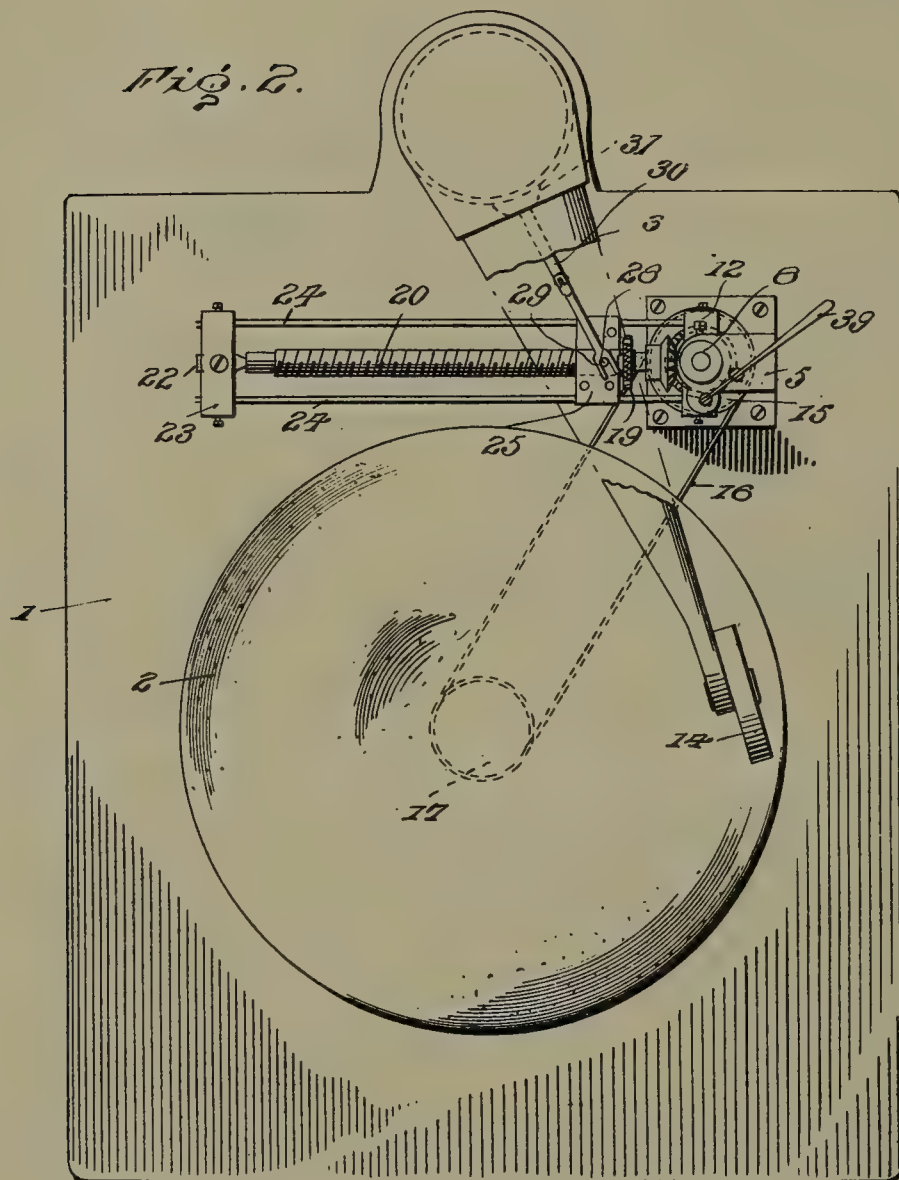
No. 891,378.

PATENTED JUNE 23, 1908.

H. SCHRÖDER.
FEED MECHANISM FOR PHONOGRAPHS.

APPLICATION FILED OCT. 17, 1907.

2 SHEETS—SHEET 2.



Witnesses

Wm. T. Murray
W. P. Woodson

Inventor

H. Schröder

By

Phas. Lacey, Attorneys

UNITED STATES PATENT OFFICE.

HERMANN SCHRÖDER, OF NEW YORK, N. Y.

FEED MECHANISM FOR PHONOGRAPHS.

No. 891,378.

Specification of Letters Patent.

Patented June 23, 1908.

Application filed October 17, 1907. Serial No. 397,922.

To all whom it may concern:

Be it known that I, HERMANN SCHRÖDER, subject of the Emperor of Germany, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Feed Mechanisms for Phonographs, of which the following is a specification.

This invention comprehends certain new and useful improvements in disk record phonographs, and the invention has for its object an improved construction of mechanism for imparting a horizontal movement to the taper arm so as to positively feed the needle or stylus transversely in the spiral groove of the rotating record disk.

The invention consists in certain constructions, arrangements and combinations of the parts that I shall hereinafter fully describe and then point out the novel features in the appended claims.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawings, in which:

Figure 1 is a rear view of a phonograph equipped with the improvements of my invention; Fig. 2 is a top plan view thereof; Fig. 3 is a sectional view, the section being taken across the guide rods of the supporting frame for the feed shaft, parts of the actuating mechanism being shown in section; Fig. 4 is a detail longitudinal section of a portion of the actuating mechanism; Fig. 5 is a detail transverse section across the feed shaft, showing the feed carriage in elevation; and, Fig. 6 is a detail perspective view of the actuating arm.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

Referring to the drawings, the numeral 1 designates the casing or cabinet of a phonograph, 2 the turn-table designed to carry the record disk, and 3 the taper arm carrying the sound box 4 and mounted to swing horizontally in the usual manner.

A bracket 5 is secured by screws or the like to the top of the cabinet 1 to one side of and at the rear of the turn-table 2, said bracket embodying an upper horizontally disposed arm formed with a depending boss 6. In the boss 6 is a spindle 7 preferably

provided with a milled head 8 and designed to be held at different adjustments in the boss by a set screw 9. A similar spindle 10 is mounted in the lower plate of the bracket in alinement with the spindle 7. The spindle 7 fits within a socket in the upper end of a trunnion 11 that is secured to and that projects upwardly from a cross bar 12. A downwardly extending trunnion 13 is also secured to the cross bar 12 and is journaled at its lower end on the upper end of the spindle 10 so that the cross bar is held to turn about a vertical axis. A sleeve 14 surrounds the trunnion 13 above the bottom plate of the bracket 5, and a pulley 15 is secured to said sleeve so as to turn therewith on the spindle. A belt 16 connects the pulley 15 with a similar pulley 17 secured on and movable with the axis of the turn-table 2.

A bevel pinion 18 is secured to the sleeve 14 above the pulley 15 and meshes with a corresponding pinion 19 on one end of the horizontally extending threaded shaft 20. This shaft is journaled at one end on a spindle 21 projecting outwardly from the middle of the cross bar 12, and is journaled at its other end to a corresponding spindle 22 secured to the cross arm 23. The two cross arms 23 and 12 are connected together at their ends by the rods 24, as clearly illustrated in the drawings, whereby to form a supporting frame.

25 designates a carriage which is formed with depending studs 26 on which rollers 27 are mounted, said rollers being movable and engaging the rods 24 so as to accurately guide the carriage in its movement along the supporting frame. The carriage 25 is formed with an upwardly projecting post 28. The forked end 29 of a preferably jointed arm 30 loosely straddles the post 28, and the other end of said arm is detachably secured in any manner in a socket 31 formed in a boss on the taper arm 3, so that the taper arm will swing with the arm 30 as the carriage is moved.

In order to effect the proper movement of the carriage within the supporting frame, the said carriage is formed with an ear 32 carrying the stud or pivot for a clamping screw that embodies two members 33. These two members are adapted to embrace the screw thread of the shaft 20 are pivotally mounted on the stud of the ear 32, and the upper ends of said members 33 are formed with inwardly

projecting pins 34 encircled by the ends of a helical expansion spring 35. Either one or both of the clamping members 33 may be formed to engage the thread of the shaft 20.

5 In describing the operation of my improved feed mechanism for the taper arm of phonographs, it is to be understood that the parts are so proportioned as to effect the proper horizontal movement of the taper arm relative to the rotary movement of the turn-table and its record disk. As the turn-table rotates, its pulley 17 will effect the rotation of the shaft 20 and the latter will feed the carriage along the frame and, through the instrumentality of the swinging arm 30, will effect the horizontal movement of the taper arms 3. This will manifestly swing the sound box and needle transversely to effect the positive feeding of the needle in the spiral groove of the record. As the arm 30 is jointed, its free forked end 29 may be raised whenever desired to remove it from engagement with the post 28 of the carriage 25. Preferably there is no positive connection between the arm 30 and the post, but the fork 29 merely straddles the post.

In the normal or operative position of the parts, the supporting frame consisting of the cross bars or arms 12 or 23 and the guide rods 24 extends across a portion of the record disk, and it is for this reason that the said frame is mounted to swing horizontally on the spindles 7 and 10, so that the frame may be move-backwardly out of the way and thereby permit one disk to be removed and another substituted therefor. In order to hold the supporting frame in proper operative position, I provide a spring pressed latch pin 36 mounted in a sleeve 37 secured to and depending from the upper end of the bracket 5. The lower end of this pin is adapted to fit in a socket 38 formed in the upper surface of the cross bar 12 near one end of the latter. The upper end of the latch pin 36 is connected to a finger lever 39 fulcrumed intermediate of its ends on the bracket 5 as clearly illustrated in the drawings, so that by pressing down upon the free end of this lever, the latch pin may be retracted and the supporting frame permitted to move.

From the foregoing description in connection with the accompanying drawings, it will be seen that I have provided a very simple, durable and efficient construction of mechanism that may be easily applied to a phonograph of the type for which the invention is intended, to positively feed the taper arm transversely as the disk rotates. In order to move the carriage backwardly to its initial or starting position, it is only necessary for one to pinch together the two upper ends of the clamping members 33 so as to release said members from the threaded shaft 20 whereupon the carriage may be slipped back and the operation repeated, the arm 30 obviously

carrying the taper arm 3 back again so that the stylus will be brought to its proper position for the commencement of a selection.

Having thus described the invention, what is claimed as new is:—

1. The combination with a phonograph embodying a rotary disk record support or turn-table, a support therefor, and a horizontally movable taper arm, of a bracket secured to said support, a horizontally movable frame supported at one end in said bracket, a revoluble shaft journaled in said frame, means for holding said frame in a position extending across the turn-table, a carriage movable in said frame, a connection between said carriage and the taper arm, means for effecting the movement of the carriage along the frame upon the rotation of the shaft and a driving connection between the turn-table and the shaft.

2. The combination in a phonograph with a disk supporting turn-table and a taper arm, and a support for the turn-table, of a bracket secured to said support, a frame held at one end in said bracket with its other end free and mounted to swing about a vertical axis, means for holding said frame stationary in a position extending across the turn-table, a threaded shaft journaled in said frame, a driving connection between the turn-table and said shaft, a carriage movable along the frame, pivoted clamping members connected to said carriage and engaging the thread of said shaft, said clamping members being arranged for manual disengagement from the shaft so that the carriage may be slipped along the frame, the said carriage being provided with an upwardly projecting post and a forked arm connected to the taper arm, the fork of said arm straddling said post.

3. In a phonograph, the combination with a turn-table and its support and a taper arm, of a bracket secured to said support, a frame supported in said bracket and adapted to extend across the turn-table, a shaft journaled in said frame, a driving connection between the turn-table and the shaft, a carriage movable along the frame and provided with an upwardly projecting post, means for moving the carriage along the frame upon the rotation of the shaft, and a jointed arm connected to the taper arm and loosely connected to the said post.

4. In a phonograph, the combination with a turn-table and its support, and a taper arm, of a bracket secured to said support, upper and lower spindles secured in said bracket and vertically disposed, a cross arm formed with upper and lower trunnions journaled on said spindles, a sleeve loosely encircling the lower spindle, a pulley secured to said sleeve and having a driving connection with the turn-table, a bevel pinion also secured to said sleeve, a screw threaded shaft journaled at one end on the cross bar, a bevel pinion

secured on said shaft and meshing with the other pinion, another cross bar in which the other end of the shaft is journaled, guide rods connected to the respective cross bars and
5 forming a frame therewith, a carriage provided with rollers mounted to run on said guide rods, a clamping screw carried by said carriage and meshing with the thread of said shaft, and an operative connection between
10 said carriage and the taper arm.

5. In a phonograph, the combination with a turn-table and its support and a taper arm, of a bracket secured to said support, feed mechanism carried by said bracket and in-
15 cluding a supporting frame comprising end bars and a carriage adapted to be moved along the frame and having an operative

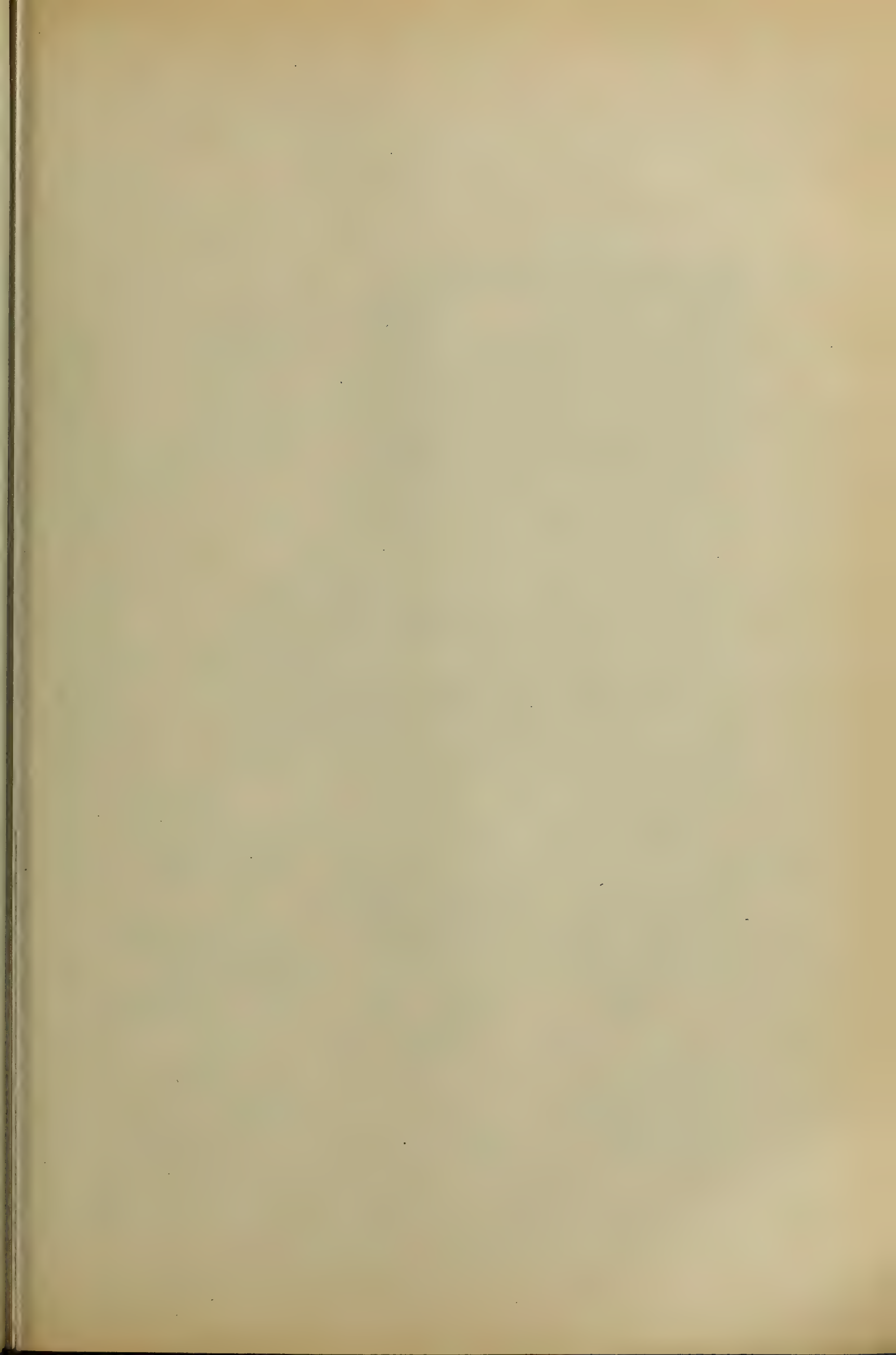
connection with the taper arm, said frame being mounted to swing in a horizontal plane on said bracket, one of said end bars being
20 formed with a socket, a sleeve secured to the bracket, a spring pressed latch pin mounted in said sleeve and adapted to enter said socket whereby to hold the frame rigid, and a
25 finger lever fulcrumed on the bracket and connected to said latch pin, as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

HERMANN SCHRÖDER. [L. s.]

Witnesses:

FREDERICK S. STITT,
W. N. WOODSON.



No. 892,045.

PATENTED JUNE 30, 1908.

L. T. HAILE.
TALKING MACHINE.

APPLICATION FILED DEC. 14, 1907.

Fig. 1.

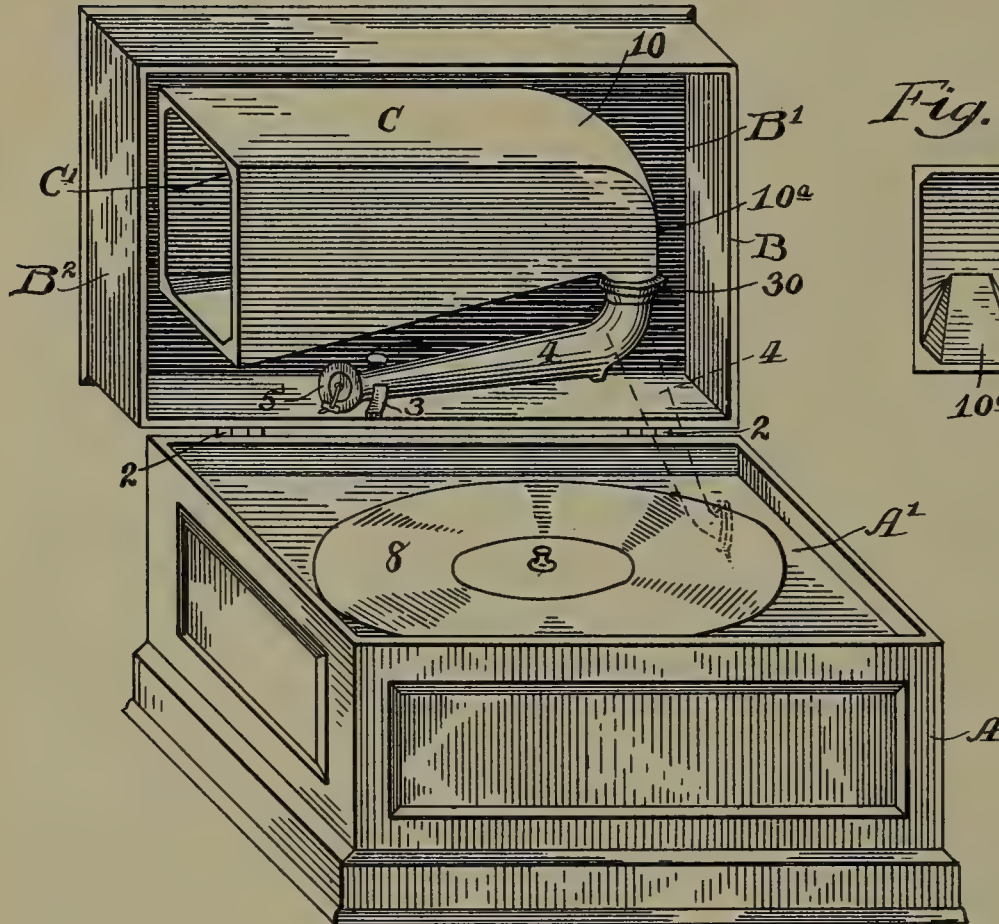


Fig. 2.

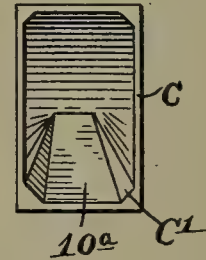


Fig. 5.

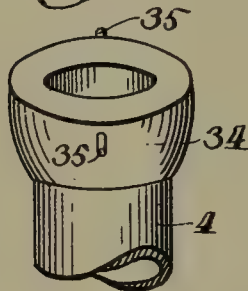


Fig. 3.

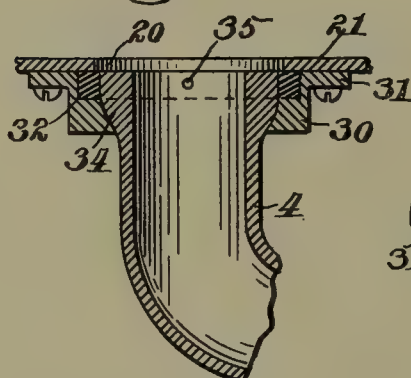


Fig. 6.

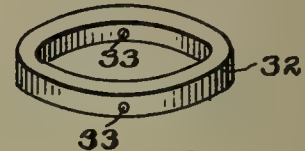
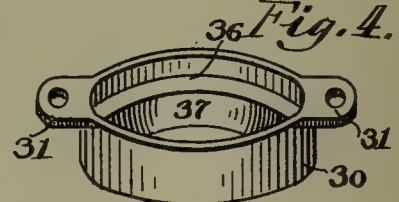


Fig. 4.



WITNESSES:

Q. M. Kiddell
J. H. Gamble

INVENTOR

Luther J. Haile
BY *H. V. Henton*

ATTORNEY.

UNITED STATES PATENT OFFICE.

LUTHER T. HAILE, OF PHILADELPHIA, PENNSYLVANIA.

TALKING-MACHINE.

No. 892,045.

Specification of Letters Patent.

Patented June 30, 1908.

Application filed December 14, 1907. Serial No. 406,415.

To all whom it may concern:

Be it known that I, LUTHER T. HAILE, citizen of the United States, residing at Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Talking-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

10 My invention relates to talking machines and has for its several objects to combine such a machine with an inclosing cabinet in which a movable closure therefor, specifically an upwardly-swinging hinged lid, shall provide the means for supporting the sound-amplifying horn or sound-discharge chamber, and whereby the latter is wholly concealed when the instrument is not in use and wholly exposed while the instrument is in operation; also in the provision of a specific character of such amplifying horn or sound-discharge chamber, whereby its usual objectionable external features are eliminated, while at same time the tone of the sound-waves discharged through it is improved in quality; and finally, in so constructing and combining the elements that the sound-conveying arm, which is pivotally mounted and supported thereby on the inlet end of the horn in operative position over the sound-record and its adjunctive mechanism, when the machine is in operation, may be, at other times swung out of operative position and into fixed position on the underface of the lid of the cabinet, and alongside the sound-discharge horn or chamber, and the lid of the cabinet closed over the body portion thereof which is adapted to contain interiorly the talking machine proper and its usual adjunctive elements as hereinafter described.

To these ends my invention consists of the combination with a containing box or cabinet provided with upwardly-swinging hinged lid, preferably constructed with side walls to give some depth thereto, and with a talking machine of any known form, save as respects its sound-conveying arm, mounted interiorly in said cabinet or box, of an amplifying horn or sound-discharge chamber mounted on the underface of said hinged lid, and a sound-conveying arm pivotally mounted by a universal joint against an inlet aperture in said amplifying sound-chamber, and discharging thereto, with its free end carrying the re-

producer of the talking machine in normal operative position on the sound-record thereof; and means whereby it may be supported, on the underface of the closure lid, in operative position, to enable the lid to be brought into closed position relatively to the open top of the body of the cabinet; and my invention also comprises other detail features in the construction of the horn itself as hereinafter described.

In the accompanying drawings illustrating my new device, Figure 1 is an elevation, in perspective, of a device exemplifying my invention in its best form as adapted to the common type of talking machine employing a rotatable disk record and a swinging tubular sound conduit carrying on its free end a reproducer contacting with such record, in operative position, as shown in dotted lines; such tubular sound conduit and reproducer being shown, in heavy lines, in inoperative position. Fig. 2 is an end view, looking into the open mouth of the horn. Fig. 3 is a vertical section of my new and desirable form of universal joint, whereby the tubular sound conduit is pivotally mounted on the inlet end of the sound-amplifying and discharging horn to enable such tubular sound conduit to have the required movement relatively to the other elements of my device; and Figs. 4, 5 and 6 are respectively elevations of the parts thereof, detached.

In all attempts heretofore made, so far as I am aware, to improve a talking machine by constructing a special form of sound-amplifying and discharging-horn element in lieu of the usual type of megaphonic horn, or to conceal it in the cabinet, an identifying but objectionable principle of construction, in all of them, is the permanent concealment, at all times, of the horn, not only while the instrument is not in use but while it is in operation and playing.

An identifying principle of construction of my new device which distinguishes it and differentiates it from those before referred to is that the sound-amplifying and discharging horn is concealed only when the instrument is not in use, and is fully exposed and thus made capable of exerting its full tonal effect on the sound-waves, when the instrument is playing, with the additional but primary advantage that the instrument, when not in use, can be closed tightly, free from dust, and presents a compact, easily transported

and ornamental cabinet device. Aside from these advantages due to its intrinsically novel features of construction, I am enabled to make and have made, in the machine described, important improvements in the form and character of the sound-discharge chamber or horn, which go far to amplify the sound-waves discharged through it from the reproducer, and improve their tone and quality.

Referring now to said drawings A represents a cabinet, with an open interior A' and a lid B hinged at 2, 2, to one of the upright walls of the cabinet body, so as to have an upwardly-swinging movement, to open the box, and a like return movement to bring it into coincidence with the top surface of the four walls of the cabinet body and wholly close the otherwise open top thereof. Within the interior A' of the cabinet body is mounted a talking machine or rather such part thereof which in the drawing is represented as the gramophone type having a rotatable disk record 8, with the usual motor to actuate it.

As shown in the drawing, the depth of the cabinet body is so proportioned relatively to this part of the talking machine as to bring the plane of the disk-record slightly below the plane of the top of the cabinet body, and the lid B is provided with side walls B² of a depth to give an interior B' equal to that of the horn, plus the space occupied by the tubular sound-conduit 4 when the latter is supported in inoperative position as shown by the heavy lines in Fig. 4. If however the lid B is made flat, and without side walls, or without side walls of a sufficient depth for the purpose stated, then the cabinet body is to be made of such relatively increased depth, so as to bring the plane of the talking machine disk 8 correspondingly lower down in the interior of the cabinet body.

As shown in the drawing, Fig. 1, the horn C is shown longitudinally disposed and fixedly mounted on the underface of the hinged cabinet lid B, in the direction of the width of the latter, which is usually wider than its planular depth; allowing some little distance between its discharge end C' and the side wall B² of the cabinet lid, if such side walls be employed. It may be made of any material commonly employed for megaphone horns, but I much prefer to construct it of wood, and to make the side walls preferably flat, and relatively rectangular, except at the rear or inlet end as hereinafter stated; and all sharp corners should be avoided, as by giving an interior surface indicated at C' in Fig. 2; and it may be fastened to the underface of the box lid by some other means than gluing one of the walls thereto, but I prefer that method and means of fastening, especially if it be set in a grooved depression in the face of the cabinet lid. Nor does the horn necessa-

rily consist of four walls, whether flat or otherwise; an essential however is that it must flare or taper from its inlet towards its discharge end, to amplify the sound-waves passing through it.

A novel feature in respect of the functional effect of my horn is the constructional form of its inlet end, by which I avoid any direct impingement of the sound waves against the wall of the horn and their consequent sudden deflection from one direction of movement to that of another and wholly different one. To that end it will be observed that the top wall 10 of the horn, the top wall being that which is opposite the inlet port 20, is curved downward at its rear end to form a rear wall 10^a which extends to a junction with the basal wall 21 of the horn (see Fig. 3) at which point a sound-inlet aperture 20 is provided.

The tapering tubular conduit 4 which conducts the sound-waves from the reproducer, as usual, to the horn, carries on its free end the usual diaphragm and stylus, and has as usual a swinging movement in a short horizontal arc over the disk record 8 when said parts are inoperative position as shown by the dotted lines, Fig. 1. To that end the tubular conduit 4 must have a pivotal bearing; but this pivotal bearing on my device, when employed with the type of disk machine shown, must be of the nature of a universal joint, for part of its function is to allow the tubular conduit 4 to be first lifted in one direction from operative position over the disk-record and then swung sidewise, beneath the lower wall of the horn, and supported in located position on the cabinet lid, such as by a hook 3.

To permit the tubular conduit 4 to have a swinging movement in a horizontal plane, and also a limited movement vertically in a short arc of a circle, and finally a sidewise movement into locked position; means to permit these motions are shown in the drawings, Figs. 3 to 6 inclusive, in which Figs. 4, 5 and 6 show the elements and Fig. 3 the same when assembled; and they are as follows:—A bracket bearing-ring 30, with ears 31 to attach it, over the inlet 20 in the superposed basal wall 21 of the horn, is provided interiorly with a narrow ledge 36 and a curved annular wall 37. The upper end of the tubular conduit 4 is provided with an enlarged head, shown in Fig. 5, having a curved exterior 34 adapted to register with the curved wall 37 of the ring, and between the two is interposed the ring 32 (Fig. 6); while to limit the vertical arc movement of the member 34 in the member 37, the former is provided with two oppositely disposed pins 35 entering holes 33 in the ring member 32, which latter rests on the ledge 37 of the member 30 and fills the space above it and is held firmly in place when the parts are assem-

bled and the bracket bearing 30 secured to the base-wall 21 of the horn, as by screws through its ears 31 as shown in Fig. 3.

It is to be understood that my invention is not limited to the employment of the particular form of horn shown, nor to the particular form of pivotal bearing for the tubular sound-conduit, nor to the employment in the cabinet, of a sound-reproducing machine of a gramophone type, employing a disk record; but on the contrary, a sound-reproducing machine of the phonograph type, employing a cylinder record or any other type, may be substituted, care being taken to supply the appropriate form of pivotal bearing for the sound-conveying arm to adapt it to any particular form or type thereof selected. And it is also to be understood that my invention is not limited to the particular type of hinged lid shown, with side walls, if the depth of the body of the cabinet be sufficient to allow space for the horn and its adjunctive parts, above the disk record, when the cabinet is closed. It is also obvious that some other form of universal joint for the pivotal mounting of the tubular sound conduit, may be employed, but I prefer the particular novel construction thereof shown which is of my invention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In a talking machine comprising a cabinet with a hinged lid, a sound-record and actuating mechanism therefor, within the body of the cabinet, an amplifying horn mounted on the inner face of the lid, a tubular sound-conveyer pivotally-supported on the inlet end of the horn, with reproducing mechanism carried on the free end of said pivotally-mounted sound-conveyer; said elements being combined and operating substantially as set forth.

2. In a talking machine the combination with a containing cabinet having an open top and a relatively movable closing lid, of sound-reproducing mechanism mounted within the body of the cabinet, an amplifying sound-discharge chamber mounted on the inner face of the lid, and a tubular sound-conveyer with connecting and supporting devices between its discharge end and the inlet end of the sound-discharge chamber operating to permit said tubular sound-conveyer to be shifted out of operative position and into inoperative and locked position against the lid of the cabinet.

3. In a talking machine a cabinet with hinged lid, an amplifying horn mounted fixedly on the underface of the lid, a reproducing sound-record with its actuating mechanism within the cabinet, a tubular sound-conveying arm carrying on one end a reproducing diaphragm and stylus, and a universal joint between its opposite end and

the inlet end of the amplifying horn, whereby said sound-arm is operatively supported.

4. In a talking machine a rectangular containing cabinet comprising a body portion with a hinged lid having side walls adapted to coincide with the upright walls of the cabinet body when in closed position, a longitudinally-disposed tapering horn operatively mounted on the underface of said hinged lid and within the plane of its side walls, a talking machine interiorly disposed within the cabinet, with supporting means operating as a universal joint between the tubular sound conduit and the inlet end of the horn whereby said tubular conduit may be moved into inoperative position and supported on the interior face of the cabinet lid when the instrument is not playing and it is desired to close the cabinet by means of its hinged lid.

5. A talking machine comprising a containing cabinet with a hinged lid, interiorly-contained mechanism for reproducing sound-waves from a sound-record, a sound-amplifying horn operatively mounted on the inner face of said lid and consisting of a tapering conduit composed of a plurality of walls the upper one of which is curved in a downwardly direction at its rearward end to form a closure thereat, an inlet aperture in the basal wall opposite the curvature in the top wall, a tubular sound-conduit carrying a diaphragm and stylus on its free end, the opposite end of said tubular conduit being provided with a pivotal bearing, whereby it is operatively supported by the horn.

6. A sound reproducing machine comprising a containing casing with an open top, a lid hinged to one of its upright walls and adapted to operate as a closure thereof, a sound-reproducing mechanism within said casing, an amplifying horn fixedly supported on the inner face of said hinged lid, and carrying a sound-conveyer operatively connecting the reproducing mechanism with the horn.

7. In a talking machine the combination with a containing cabinet having a hinged lid, of a megaphone which is mounted on the inner face thereof, a tubular sound conduit communicating therewith, a universal joint between the same, means to support the free end of said tubular conduit, in inoperative position against the face of the cabinet lid, and sound-reproducing mechanism supported within the body of the cabinet adapted to operatively co-act with the tubular sound-conduit when the latter is swung into normal and operative position.

8. In a talking machine comprising a containing cabinet with a hinged lid, an amplifying horn which is mounted on the underface of the lid, and consisting of a plurality of wooden walls, forming a tapering sound-conduit, the basal wall having at one end an inlet aperture and the top wall being

curved downwardly opposite said inlet end,
and a talking machine within the cabinet
body having its traversing tubular sound-
conduit pivotally supported at its discharge
5 end on the basal wall of said horn and over
the inlet aperture thereof.

In testimony whereof, I have hereunto

affixed my signature this twelfth day of De-
cember A. D. 1907.

LUTHER T. HAILE.

Witnesses:

A. M. BIDDLE,
J. A. SNYDER.

No. 892,205.

PATENTED JUNE 30, 1908.

G. J. ANDERSON.
DIAPHRAGM FOR RECORDERS OR REPRODUCERS.
APPLICATION FILED OCT. 16, 1907.

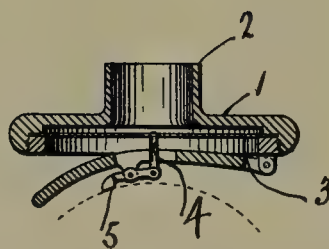


FIG. 1.

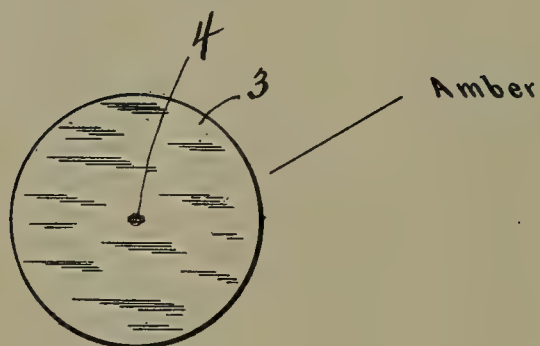


FIG. 2.

WITNESSES:

Hallus L. Freeman
Marj Lorenil Lemay

INVENTOR

Gustaf J. Anderson
by *W. H. Anderson* Atty.

UNITED STATES PATENT OFFICE.

GUSTAF J. ANDERSON, OF ALLSTON, MASSACHUSETTS.

DIAPHRAGM FOR RECORDERS OR REPRODUCERS.

No. 892,205.

Specification of Letters Patent.

Patented June 30, 1908.

Application filed October 16, 1907. Serial No. 397,802.

To all whom it may concern:

Be it known that I, GUSTAF J. ANDERSON, citizen of the United States, residing at Allston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Diaphragms for Recorders and Reproducers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to sound recording and reproducing instruments such as phonographs and graphophones and more particularly to certain improvements in the diaphragms of the recorders and reproducers, the object being to produce a diaphragm which will be entirely free from the "frying" or scratching so common in these instruments as now constructed and one which will reproduce the sounds clear and resonant and entirely free of the objectionable "frying" or scratching sounds.

Many attempts have been made to eliminate the objectionable "frying" or scratching sounds in these instruments but as yet no one seems to have solved the problem and in consequence what would be in other respects a perfect machine and a source of much pleasure to the listener is marred by the "frying" and scratching sounds of the diaphragm.

To the end of producing a sound recording and reproducing apparatus which shall be entirely free from the objectionable noises referred to, my invention consists of the diaphragm which will now be described and claimed.

My invention is illustrated in the accompanying drawing, in which:—

Figure 1 illustrates a transverse sectional view of a reproducer of a phonograph showing my improved diaphragm therein, and

Fig. 2 shows a plan view of the diaphragm removed from the reproducer.

Similar reference characters will be used throughout the specification and drawings to designate corresponding parts.

In the drawing 1 indicates the holder of the diaphragm, having the cylindrical tube 2, to receive the horn and supporting the diaphragm 3, which is provided with a post 4 and the needle carrier 5. The holder is of the usual and ordinary construction, and except as hereinafter described, does not differ from similar devices of the prior art.

My improved diaphragm 3 is made of amber and except for this difference is like those now in general use. It consists of a thin disk of the usual shape and thickness, circular in form; it may be, however, of any shape in outline. I preferably make it of block amber cut in circular form and then ground down and dressed to the desired thickness, but it may be of molded amber. By the use of amber I have demonstrated by experiment that the objectionable "frying" and scratching sounds are substantially eliminated.

Having described my invention I claim as new and desire to protect by Letters Patent of the United States:—

1. A diaphragm for sound recording and reproducing instruments comprising a thin plate or disk of amber.

2. A diaphragm for sound recording and reproducing instruments comprising a thin plate or disk of molded amber.

In testimony whereof I affix my signature, in presence of two witnesses.

GUSTAF J. ANDERSON.

Witnesses:

T. HART ANDERSON,
MARY F. KENNEY.

No. 892,301.

PATENTED JUNE 30, 1908.

B. F. PHILPOT & F. W. MATTHEWS.

PHONOGRAM.

APPLICATION FILED SEPT. 25, 1907.

Fig. 1,



Fig. 2,

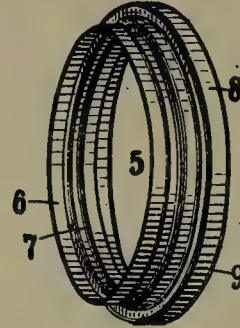


Fig. 3,

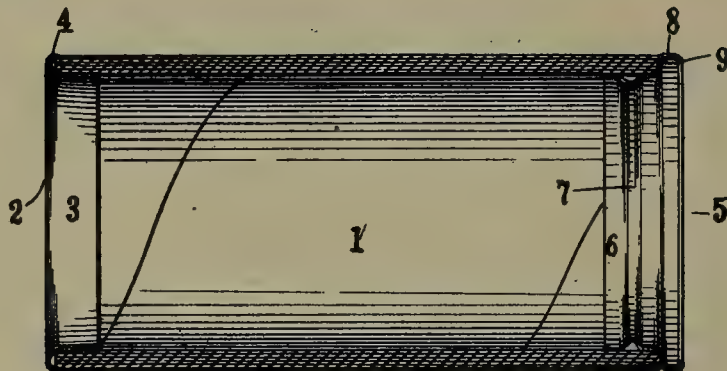


Fig. 4,

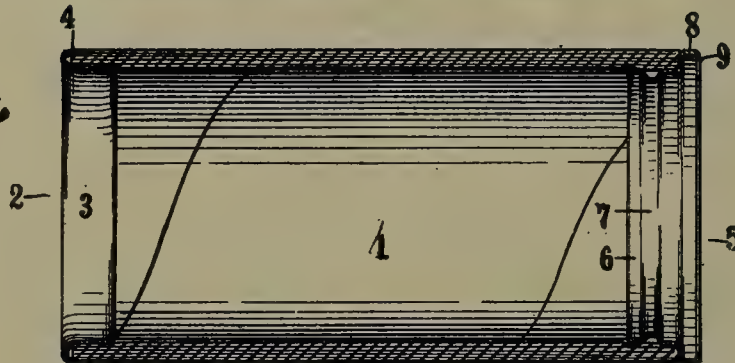
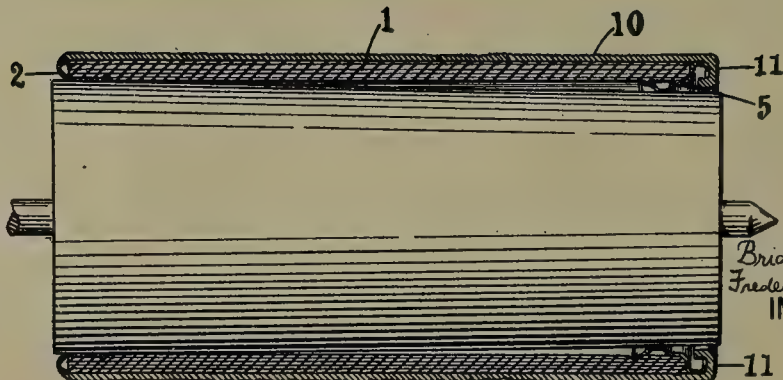


Fig. 5,



WITNESSES:

Am. Chittenden

Conrad Liehl

Brian F. Philpot.
Frederick W. Matthews
INVENTORS,

BY

Robt. B. Stillman,
ATTORNEY

UNITED STATES PATENT OFFICE.

BRIAN F. PHILPOT, OF SLINGERLANDS, AND FREDERICK W. MATTHEWS, OF NEW YORK, N. Y., ASSIGNORS TO INDESTRUCTIBLE PHONOGRAPHIC RECORD COMPANY, A CORPORATION OF WEST VIRGINIA.

PHONOGRAM.

No. 892,301.

Specification of Letters Patent.

Patented June 30, 1908.

Application filed September 25, 1907. Serial No. 394,536.

To all whom it may concern:

Be it known that we, BRIAN F. PHILPOT and FREDERICK W. MATTHEWS, citizens of the United States, respectively residing at Slingerlands, Albany county, New York, and New York city, in the county of Kings and State of New York, have invented certain new and useful Improvements in Phonograms, of which the following is a specification.

Our invention relates to improvements in cylindrical phonograms or sound records for talking machines and our principal objects are to cheaply produce such devices having the sound record on a shell of hard or "indestructible" material like celluloid, backed by a suitable material and provided with bearing rings of relatively low co-efficient of expansion on the ends to engage the machine mandrel. We attain these objects in the manner illustrated in the accompanying drawing in which

Figure 1 is a view of one of the bearing rings; Fig. 2 a view of the other bearing ring; Fig. 3 a sectional view of our improved backing with the rings inserted but without the record shell; Fig. 4 a like view with the rings secured to the backing which has been surfaced to receive the shell; and Fig. 5 a view, partly in section of a complete phonogram on a machine mandrel.

Any suitable backing material, such as paper or cardboard is formed into tubes of proper length and forms the foundation of the phonogram.

A metallic ring 2 having a bearing part 3 adapted to contact with the machine mandrel and the turned over lip 4 is pushed into one end of the backing tube 1 with the bearing part 3 inside and the lip 4 outside. A second ring 5 is made with the part 6 to contact with the inside of the tube 1, the inwardly extending bearing groove 7 adapted to contact with the machine mandrel and an upstanding rabbet 8 provided with the rolled over edge 9 and is placed in the other end of the tube 1. The tube and rings are then subjected to the action of internal and external rolling tools and the inner ends of the bearing rings, the parts marked 3 and 6, are reamed into the tube as shown in Fig. 4, the outer lip 4 and rabbet 8 being rolled down into alinement with the surface of the tube

which at the same time is compressed to a standard size. This rolling or reaming of the edges prevents withdrawal of the rings. The record shell 10 carrying the sound record on its face is made by any of the well known methods and is preferably of celluloid or like material provided with the integral end ring 11 which may carry any suitable inscription such as the name of the selection. This record shell is pushed onto the completed backing of Fig. 4, the lip 9 preventing cutting, the end of the ring of the shell concealing the metal bearing ring 5, but not contacting with the machine mandrel. The forward end of the shell 10 covers the lip 4 and presents a neat appearance. By this construction a record is produced which is practically indestructible. As its only contact with the mandrel is two metal rings it is easily put on and removed. The record shell is supported throughout its entire extent and the quality of the reproduction is improved thereby.

As there is no appreciable contraction of the metal rings and their internal bearing diameters are accurately determined in manufacturing all records will occupy the same space on the mandrel and consequently records for a given mandrel can be longer than if material having a high co-efficient of expansion is used to make the record.

We are aware that metal bearing rings have been inserted in celluloid records or phonograms but such rings have heretofore been attached directly to the celluloid.

We are also aware that backed celluloid phonograms have heretofore been made and we do not claim such structures broadly.

We claim:—

1. A backing for phonograms comprising a tube of suitable material adapted to receive a record shell and independent, separated metallic bearing rings in the ends of the tube adapted to contact with the machine mandrel.

2. A backing for phonograms comprising a tube of suitable material, a bearing ring inside of one end having a lip turned against the outer edge of the tube and its inner edge forced into the inner face of the tube; and a ring in the other end of the tube having its inner edge forced into the inner face of the tube, a pressed up rib therein adapted to

contact with the machine mandrel, a projecting rabbet alining with the outer face of the tube and a turned over outer edge.

5 3. A phonogram comprising a backing tube of suitable material, independent, separated bearing rings in each end adapted to contact with the machine mandrel and a shell of celluloid or like material having a sound record on its face in intimate contact
10 with the outer face of the backing tube.

4. A phonogram comprising a backing tube of suitable material, bearing rings in each end adapted to contact with the machine mandrel and a shell of celluloid or like
15 material having a sound record thereon on the outer face of the tube in intimate contact

therewith, an integral inscription ring on one end of the shell adapted to conceal one of said bearing rings.

5. A backing for phonograms comprising a 20 tube of suitable material adapted to receive a record shell and a metallic bearing ring in one end of said tube adapted to contact with the machine mandrel the backing adapted to contact with the mandrel at the other end. 25

In testimony whereof we have affixed our signatures in presence of two witnesses.

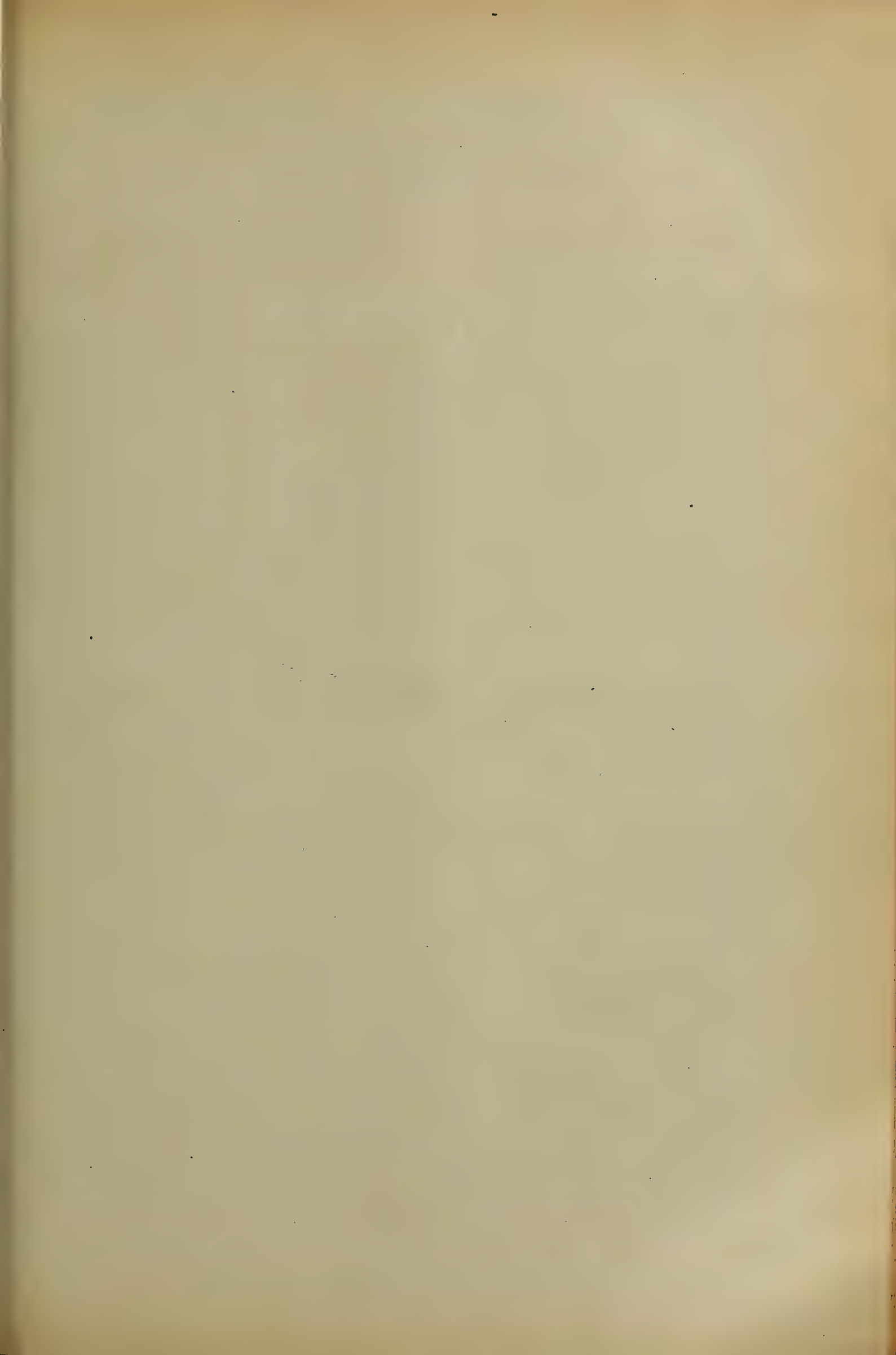
BRIAN F. PHILPOT.

FREDERICK W. MATTHEWS.

Witnesses:

ROBT. B. KILLGORE,

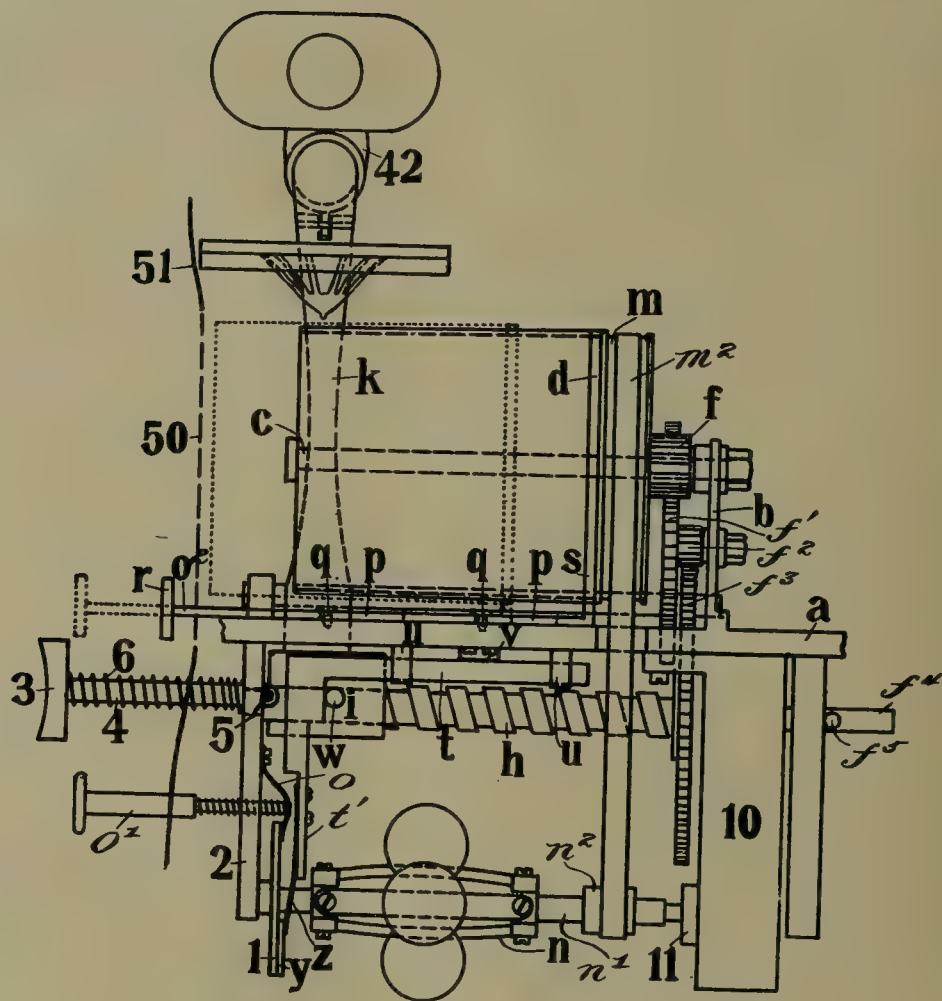
CONRAD DIEHL.



No. 892,494.

PATENTED JULY 7, 1908.

O. ARNOLD.
PHONOGRAPH.
APPLICATION FILED JULY 28, 1906.



Witnesses:-

C. H. Crawford
L. Waldman

Inventor

Oscar Arnold
by B. Singer
Attorney

UNITED STATES PATENT OFFICE.

OSCAR ARNOLD, OF NEUSTADT, NEAR COBURG, GERMANY.

PHONOGRAPH.

No. 892,494.

Specification of Letters Patent.

Patented July 7, 1908.

Application filed July 28, 1906. Serial No. 328,230.

To all whom it may concern:

Be it known that I, OSCAR ARNOLD, a subject of the Emperor of Germany, residing at Neustadt, near Coburg, Germany, have invented certain new and useful Improvements in Phonographs, of which the following is a full, clear, and exact description.

This invention relates to improvements in phonographs and has to do more particularly with improved devices for operating the recorder or reproducer support abreast of the record and also to improvements in braking mechanism adapted for use in connection with such machines.

One of the objects of the invention is to provide means for moving the recorder support abreast of the record and to so construct said means as to obtain automatic return of the record or reproducer support to an initial position after the record has been reproduced or recorded, as the case may be, for the purposes of reproducing or recording a new record.

A further object is to provide improved braking mechanism for automatically arresting and permanently braking the recorder or reproducer support and the driving mechanism at a predetermined point in the operation thereof.

The invention will be more fully described in connection with the accompanying drawing and will be more particularly pointed out and ascertained in and by the appended claims.

In the drawing the figure is a view in elevation of a machine embodying the main features of my invention.

Like characters of reference designate similar parts throughout the drawing.

The invention will now be described in detail in connection with the specific form illustrated but it will be understood that the invention is not to be limited to such specific showing except for such limitations as the claims import.

As shown the mechanism is mounted upon a suitable base *a* provided with a support *b* adapted to form a bearing for a record holder spindle *c* upon which latter is mounted the record support or holder *d*. In the specific showing made the device of my invention is applied to machines having cylindrical records but its application is not limited to this class of machines. The record holder *d* is

driven by means which as shown consists of a train of gears connected with a source of power, said train comprising a gear *f* meshing with a gear *f'* and communicating there-through by gears *f²* and *f³* with a source of power which is indicated at 10 and which may consist of the usual clock spring. A main shaft or driving member *f⁴* is provided and is adapted to be driven in one direction for operating parts hereinafter to be described and reversely operated for restoring said parts to an initial position. To this end said shaft may be provided with lugs or pins *f⁵* adapted to be engaged by a winding crank. A suitable governor *n* may be provided and as shown said governor is mounted upon a shaft *n'*, having a bearing at one end in a suitable stationary part and at its other end in a pendent support 2 secured to the base *a*.

A sheave *m* is provided on the record holder *b* and a pulley *n²* on the shaft *n'* over which is trained a belt *m²* which constitutes the specific means herein shown for operatively connecting the governor with the record holder. Said shaft *n'* carries a braking disk or member 1 adapted to be engaged by means for normally or permanently maintaining the device in a position of rest, which means as shown, consists of a spring brake *o* secured at one end to the support 2 and engaging at its free end the braking disk 1. An adjusting screw *o'* having threaded engagement with the support 2 is adapted for engagement with the spring *o* to either hold the latter permanently out of engagement with the disk 1 or permit it to permanently engage the same.

A support *k* is provided and adapted for attachment with either a recorder or reproducer and is provided with means 42 for the reception of a horn or a speaking trumpet. Said support *k* is adapted to be operated abreast of the record to carry the recorder or reproducer across the face of the same and is operatively related with the driving means in such a manner that when the latter is operating to effect a reproduction or recording of a record the support is moved from an initial position in one direction until the record has been reproduced or recorded and when the driving means is reversely operated the support is automatically restored to an initial position.

As shown the shaft *f⁴* is provided with a

threaded extension h and the support k is provided with a boss i having threaded engagement with said extension h . When the winding spring acts through the gear train to operate the record holder and its record the threaded extension h moves the support k abreast of the record until the latter has been reproduced. When the winding crank is applied to the shaft f^4 and the latter is operated in a reverse direction the parts just described serve to return the reproducer support to an initial position.

Next referring to the improved braking mechanism the same consists of braking means adapted to be operated by the reproducer support to arrest the driving mechanism automatically and further in a device adapted to cooperate with said means to release braking engagement and also in mechanism cooperating with said means to maintain it out of braking adjustment until such a time as the reproducer support has reached the limit of its movement and it is desired to bring the device to a position of rest.

Specifically the braking means consists of a bar t mounted in bearings u and provided with an extension t' preferably disposed at right angles to the body of the bar t and adapted at its upper portion to be engaged by a pin w mounted upon the boss i . At its lower end said extension t' carries a brake shoe y which is desirably connected with said extension by means of a spring z . A spring v mounted upon the base a is adapted to frictionally engage the bar t and retard movement thereof in either direction. A plunger 4 provided with a thumb piece 3 is mounted in the support 2 and is adapted at its free end to engage the bar t when actuated to force it to the right against the action of spring v and release engagement between the brake shoe y and the disk 1. A spring 6 normally retains the plunger 4 in the position shown and a pin 5 limits movement of the plunger under the action of the spring 6 so as to prevent the latter from forcing the plunger out of engagement with the support 2.

In starting the machine and assuming that the same is wound and the parts are in an initial or starting position the operator will first press the plunger 4 inwardly a slight distance to disengage the shoe y from the disk 1 thereby releasing the governor and permitting the driving mechanism to operate. It will be understood that the support will have been previously returned to an initial position so that the stud w will not interfere with the movement of the bar t just described. Upon movement of the bar t to the right the spring v , normally engaging the same, will maintain it in the position to which it has been moved until the support k , which may be assumed to be now traveling from an initial or right hand position, to a left hand position has engaged the stud w with the bar

t which engagement will overcome the resistance of the spring v and will force the brake shoe y into engagement with the disk 1. It will be understood that when the machine is being operated the permanent braking device will be adjusted in a manner to maintain the spring o out of engagement with the disk 1.

Means are provided for removing the record from the record holder without touching the face of the record and as shown such means consists of a bar o^2 which is provided with an extension s adapted to encircle the record holder d and lie between the sheave m and the record. Said bar o^2 is provided with a button r adapted to be grasped by the operator and pulled outwardly to release the record.

Having now described my invention what I claim and desire to secure by Letters Patent of the United States is:

1. A talking machine comprising in combination, a spring barrel, a shaft therefor provided on one end with projections adapted to be engaged by a winding crank and having a worm formed on its opposite end, a gear train driven from said shaft, a record holder driven from said train, a governor provided with a brake disk, a belt connecting said governor and record holder, a permanent spring brake engaging said brake disk, an adjusting screw for said spring brake, an automatic braking device comprising a spring mounted brake shoe adapted for engagement with said disk and a slidably mounted support, a spring brake for said support, a nut carried by said worm, a transmitter support mounted on said nut, and a spring actuated plunger for throwing said automatic braking device out of engagement with said brake disk.

2. A talking machine comprising in combination, a spring barrel, a shaft therefor provided on one end with projections adapted to be engaged by a winding crank and having a worm formed on its opposite end, a gear train driven from said shaft, a record holder driven from said train, a governor provided with a brake disk, a belt connecting said governor and record holder, an automatic braking device comprising a spring mounted brake shoe adapted for engagement with said disk and a slidably mounted support, a spring brake for said support, a nut carried by said worm and provided with a pin adapted to engage said automatic brake support, a transmitter support mounted on said nut, and a spring actuated plunger for throwing said automatic braking device out of engagement with said brake disk.

3. A talking machine comprising in combination, a spring barrel, a shaft therefor provided on one end with projections adapted to be engaged by a winding crank and having a worm formed on its opposite end, a gear train driven from said shaft, a record

holder driven from said train, a governor provided with a brake disk and driven from said record holder, an automatic braking device comprising a spring mounted brake shoe adapted for engagement with said disk and a slidably mounted support, a spring brake for said support, a nut carried by said worm and provided with a pin adapted to engage said automatic brake support, a transmitter support mounted on said nut, and means for throwing said automatic braking device out of engagement with said brake disk.

4. A talking machine comprising in combination, a spring barrel, a shaft therefor provided on one end with projections adapted to be engaged by a winding crank and having a worm formed on its opposite end, a gear train driven from said shaft, a record holder driven from said train, a governor driven from said record holder and provided with a brake disk, a braking device comprising a brake shoe adapted for engagement with said disk and a slidably mounted support, a brake for said support, a nut carried by said worm and provided with a pin adapted to engage said brake support to throw said shoe into engagement with said disk, a transmitter support mounted on said nut, and means for throwing said braking device out of engagement with said disk.

5. A talking machine comprising in combination, a spring barrel, a shaft therefor provided on one end with projections adapted to be engaged by a winding crank and having a worm formed on its opposite end, a gear train driven from said shaft, a record holder driven from said train, a governor driven from said record holder and provided with a brake disk, a braking device comprising a brake shoe adapted for engagement with said disk and a slidably mounted support, a brake for said support, a nut carried by said worm and provided with a pin adapted to engage said brake support to throw said shoe into engagement with said disk, and a transmitter support mounted on said nut.

6. A talking machine comprising in combination, a winding shaft provided on one end with a worm, means for driving said shaft, a gear train driven from said shaft, a record holder driven from said train, a governor driven from said record holder and provided with a brake disk, a braking device co-operating with said disk, means for holding the braking device in a non-operating position, a transmitter support actuated by said worm and engaging said braking device to throw the same into an operating position, and means for throwing said braking device into a non-operating position.

7. A talking machine comprising in combination, a main shaft provided with a worm, means for driving said shaft, a gear train driven from said shaft, a record holder driv-

ing from said train, a governor driven from said record holder provided with a brake disk, a braking device co-operating with said disk, yieldingly acting frictional means for holding said braking device in a non-operating position, and a transmitter support operated by said worm and engaging said braking device to throw the same into an operating position.

8. A talking machine comprising in combination, a main shaft provided with a worm, means for driving said shaft, a record holder operatively connected with said shaft, a governor driven from said record holder and provided with a brake disk, a braking device co-operating with said disk, a transmitter support operated by said worm and engaging said braking device to throw the same into an operating position, manually operable means for disengaging said braking device from said disk, and frictionally acting means for maintaining said braking device in its disengaged position.

9. A talking machine comprising in combination, a main driving shaft, a record holder operatively connected with said shaft, a governor driven by said record holder, a braking device, a transmitter support operated by said shaft and engaging said braking device to throw the same into an operating position, manually operable means for throwing said braking device into a non-operating position, and frictionally acting means for maintaining said device in a non-operating position.

10. A talking machine comprising in combination, a main shaft adapted to be driven in one direction for operating parts and in a reverse direction for restoring parts to an initial position, a record holder driven by said shaft, a transmitter support operatively associated with said shaft to be driven and restored thereby, and braking mechanism adapted to be engaged by said transmitter support to automatically stop the machine.

11. A talking machine comprising in combination, a main shaft adapted to be driven in one direction for operating parts and in a reverse direction for restoring parts to an initial position, a record holder driven by said shaft, a transmitter support operatively associated with said shaft to be driven and restored thereby, braking mechanism adapted to be engaged by said transmitter support to automatically stop the machine, and means for holding said braking mechanism in a non-operating position.

12. A talking machine comprising in combination, a main shaft adapted to be driven in one direction for operating parts and in a reverse direction for restoring parts to an initial position, a record holder driven by said shaft, a transmitter support operatively associated with said shaft to be driven and restored thereby, braking mechanism adapt-

ed to be engaged by said transmitter support to automatically stop the machine, and means for throwing said braking mechanism out of an operating position.

5 13. A talking machine comprising in combination, a cylindrical record support, and means for removing the record therefrom comprising an operating rod or bar provided

with an extension looped about said cylindrical support. 10

In testimony whereof I affix my signature in presence of two witnesses.

OSCAR ARNOLD.

Witnesses:

OLGA HINZE,
MAX SCHUSTER.

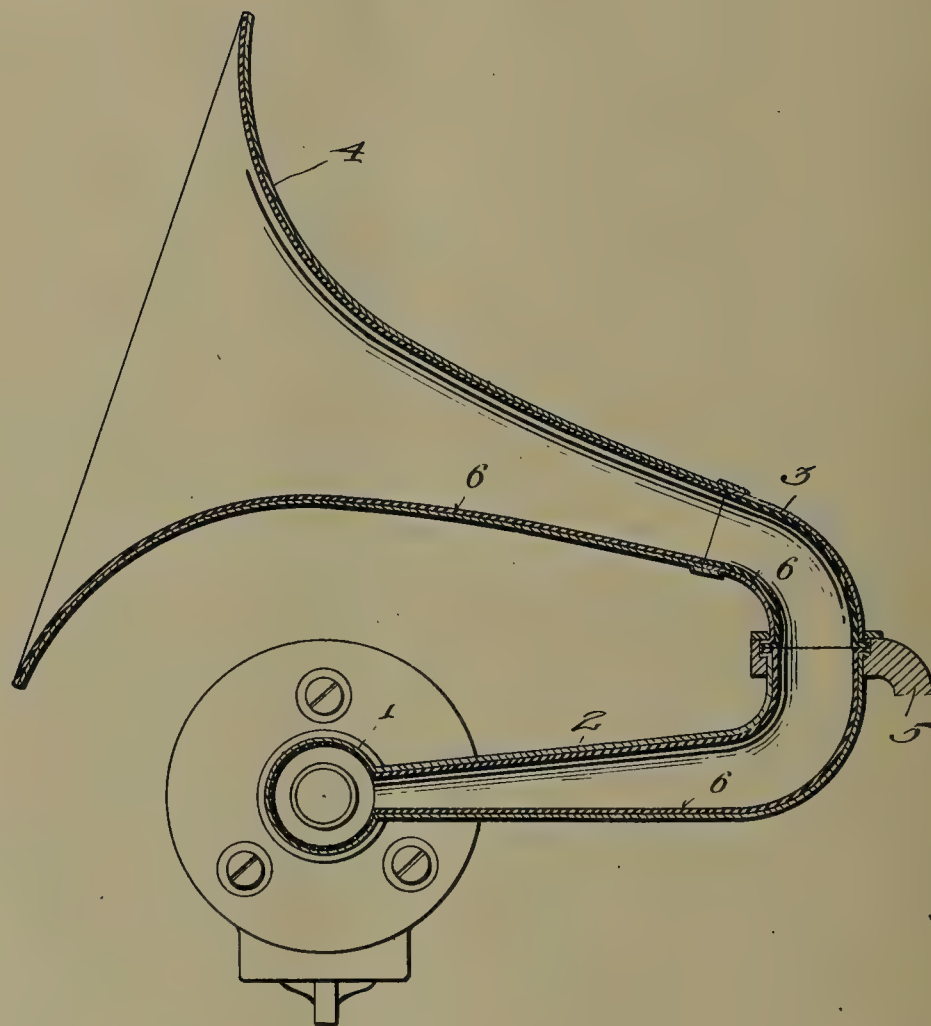
No. 892,520.

PATENTED JULY 7, 1908.

J. O. HIRSCHFELDER.

APPARATUS FOR PHONOGRAPHS AND GRAPHOPHONES.

APPLICATION FILED MAR. 7, 1908.



Witnesses

For Invention
L. B. Baker

Inventor

Joseph O. Hirschfelder.

By *Audley, Brown & Phelps*

Attorneys

UNITED STATES PATENT OFFICE.

JOSEPH OAKLAND HIRSCHFELDER, OF SAN FRANCISCO, CALIFORNIA.

APPARATUS FOR PHONOGRAPHS AND GRAPHOPHONES.

No. 892,520.

Specification of Letters Patent.

Patented July 7, 1908.

Application filed March 7, 1908. Serial No. 420,610.

To all whom it may concern:

Be it known that I, JOSEPH OAKLAND HIRSCHFELDER, citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Apparatus for Graphophones and Phonographs, of which the following is a specification.

My invention relates to improvements in the sound-box, sound-conducting tubes and horns which are used in connection with graphophones, phonographs, talking-machines and the like sound producing instruments, and it has for its object the construction of these several parts in such manner as to prevent their undue vibration by the sound waves passing therethrough.

In the accompanying drawing representing a sectional view of a sound-box, a conducting tube and horn of a graphophone or phonograph there is shown my improved lining applied to said parts.

1 is the sound box, 2 the conducting tube, 3 the elbow, 4 the horn and 5 the bracket or support.

6 designates the lining applied to the interior of the before designated parts.

As the result of my experiments I have found that by providing the conducting tube or elbow of the horn, and the horn with a lining made in one piece, or by making said parts in two pieces and providing each with a separate lining of sound deadening material, I am enabled to avoid all vibrating edges and to produce a structure free from secondary or accessory vibrations, thereby softening or deadening the sound waves, and relieving the instrument from the metallic or harsh effect of such sounds and thus preserving the natural tones either of the human voice or of instrumental music when reproduced thereby.

In the carrying out of my invention I have found that by lining the sound box, as well as the sound conducting tube and horn, with a soft non-sonorous material of a wax-like nature such as wax, or a composition of which wax is an ingredient, I accomplish the desired result. The compound may be heated to a degree of fluidity sufficient to enable me to supply the same as a coating or

lining of the desired thickness to the interior of the part, thereby producing a smooth sound-receiving and sound-conducting body of even thickness.

The lining may be applied in one of a number of ways. It may be liquefied by heat or by a solvent and applied by dipping, or by means of a brush, or by pouring the liquefied material into the interior of the parts and turning such parts until the lining material has been evenly distributed over the same and has solidified thereon. The parts may be split and the lining applied thereto, and the parts then reassembled. The lining may also be applied in the form of a sheet of the material instead of coating the same on the parts as described.

In the use of apparatus constructed in accordance with my invention I have found that the sound produced therefrom is free from unnatural vibrations, is sonorous, and a faithful reproduction of the record which is being reproduced, whether the same be that of the human voice in speaking or singing, or that of musical instruments.

Preferably the coating which I have described herein is used in connection with sound-conducting tubes and horns made of papier-mâché, although other material may be employed for the making of these parts.

While I have described herein the preferred embodiment of my invention, it will be understood that various departures may be made therefrom without departing from the scope thereof.

I claim:

1. A graphophone, phonograph, or the like instrument, having its sound receiving and conducting parts coated on the inside with a non-sonorous material of a wax-like nature which is adapted to be applied thereto while in a liquid condition and which will harden and adhere to the surface to which it is applied.

2. A graphophone, phonograph, or the like instrument, having its sound receiving and conducting parts coated on the inside with a non-sonorous material of a wax-like nature that is soluble under heat and will adhere when cold to the surface to which it is applied.

3. The combination with a graphophone, phonograph, or the like instrument, of a

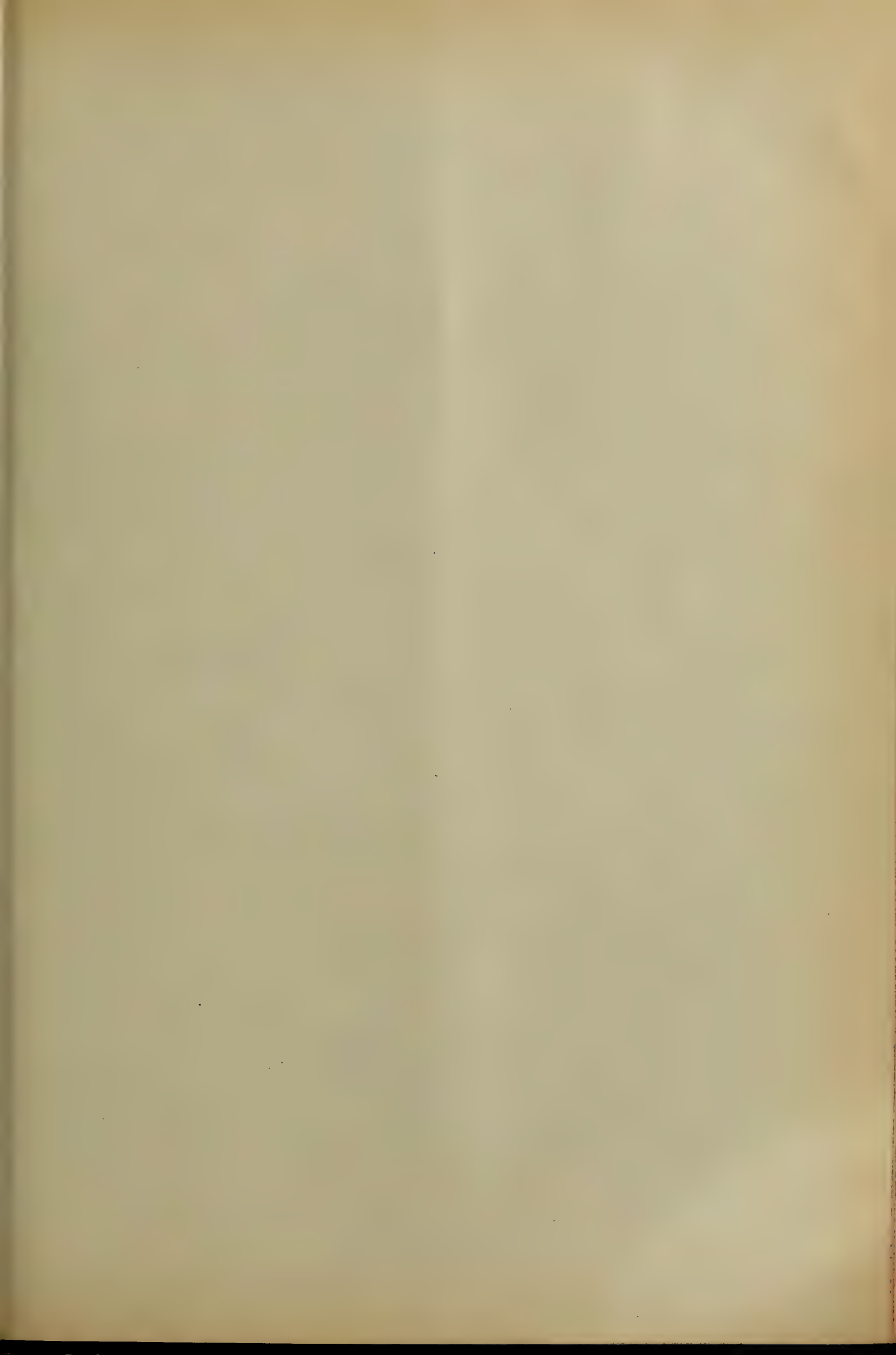
sound receiving and conducting apparatus
therefor made from papier-mâché and coated
on the inside with a non-sonorous material
of a wax-like nature which is adapted to be
5 applied thereto while in a liquid condition
and which will harden and adhere to the sur-
face to which it is applied.

In testimony whereof I affix my signature
in presence of two witnesses.

JOSEPH OAKLAND HIRSCHFELDER.

Witnesses:

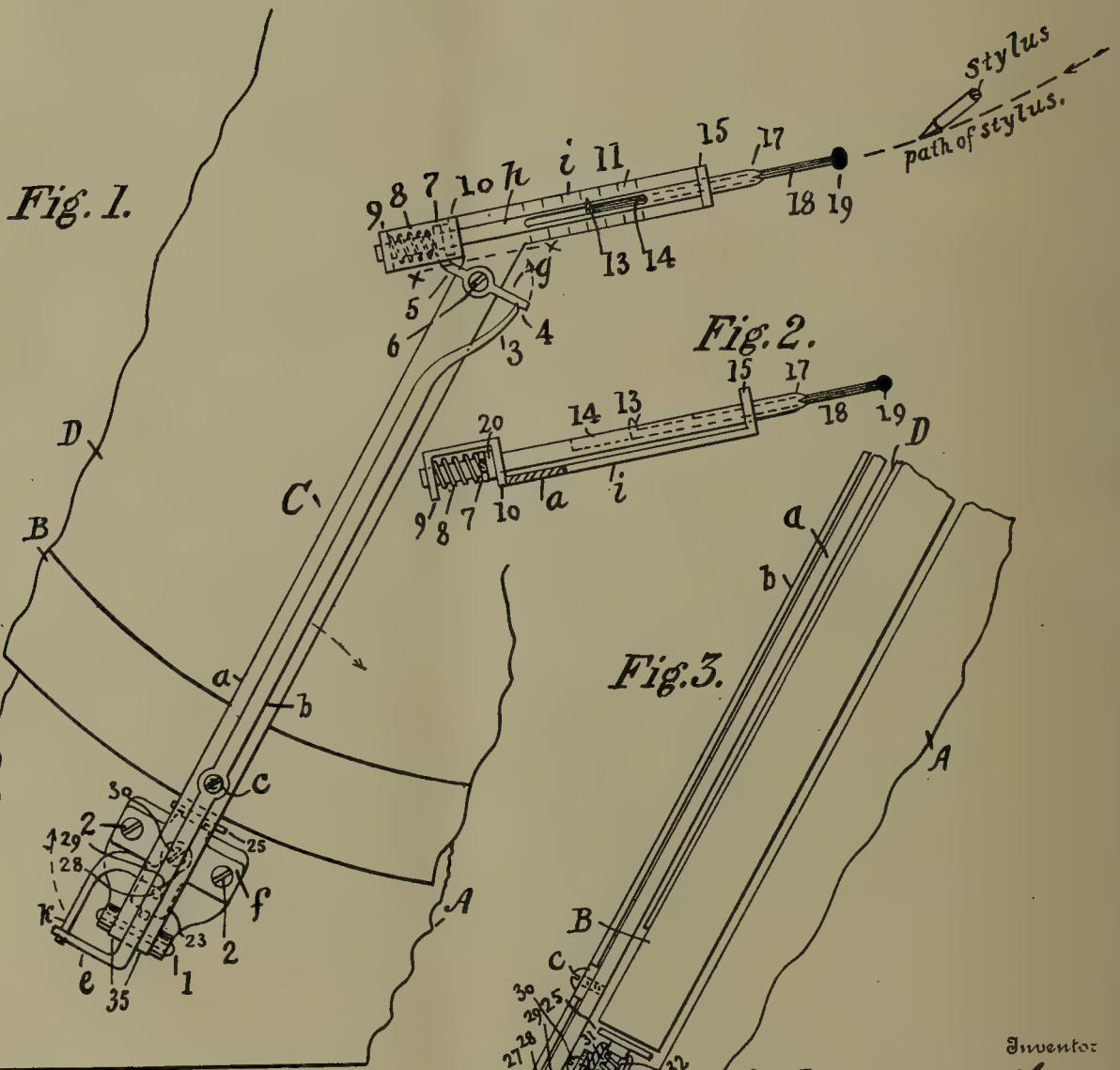
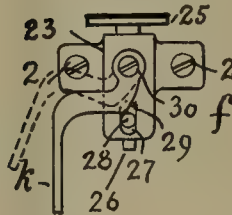
DANIEL BLOCK,
FRANK MANDEL.



O. F. FALK.
PHONOGRAPH.

APPLICATION FILED FEB. 11, 1908.

Fig. 4.



Witnesses
Jos. J. Monahan
Charles W. Knuth

Inventor
Oscar F. Falk
G. Lewis Price
Attorney

UNITED STATES PATENT OFFICE.

OSCAR F. FALK, OF BELLEVILLE, NEW JERSEY.

PHONOGRAPH.

No. 893,230.

Specification of Letters Patent.

Patented July 14, 1908.

Application filed February 11, 1908. Serial No. 415,346.

To all whom it may concern:

Be it known that I, OSCAR F. FALK, residing at Belleville, in the county of Essex and State of New Jersey, have invented certain Improvements in Phonographs, of which the following is a specification.

The present invention relates to an improved automatic stop mechanism for sound reproducing machines, and is particularly adapted to machines using a flat circular record.

The object of the invention is to provide adjustable and automatic means for stopping and holding the turn-table or record support of a gramophone or other similar device upon the completion of the reproduction, whether the impressions of the music, words, etc., and say on the 125th revolution of the record or on any other revolution of the same. If desired the apparatus may be adjusted so as to stop and hold the turn-table at any point in the revolution of the record; automatically, whether the record be completed or not.

I have chosen to represent the invention by a construction which I will now proceed to describe and claim, although I do not limit myself to the precise details shown as they may be much changed without departing from the spirit of the invention.

Of the drawings which form a part of and illustrate the invention—Figure 1 is a fragmentary plan view of a gramophone table and turn-table or record-support, to which is applied the invention. Fig. 2 is a sectional edge view of a portion of the apparatus on line $x-x$ of Fig. 1. Fig. 3 is an edge view of Fig. 1; and Fig. 4 is a plan view of a detached part.

In the drawings A represents a portion of the table of a gramophone, and B a portion of the turn-table supported upon a shaft which enters the table and is there provided with means for rotating the same, not shown, but all in a manner well understood.

Ordinarily there is provided upon the table A a stopping and starting device acting as a brake, consisting of a piece f having two wings secured to the table by screws 2, 2, bearing a cylindrical portion 23 bored out at one end to receive the spiral spring 32 through which extends the bolt 26 whose end projects through the smaller hole in the portion 23; and the bolt is provided with a stud 28 adapted to play in the slot 27; to the outer end of the bolt is attached an enlarged

foot piece 25 whose face is covered with cloth or other frictional material. Upon the top of the portion 23 is pivoted by a screw 30 a cam lever k having an elbow 29 adapted to engage the stud 28 and hold the same against the pressure of the spiral spring 32. I employ this device in connection with my invention and when the spring 32 is compressed, the cam part 29 and the stud form a sort of hair-trigger.

When the turn-table is at rest the lever is moved away from the stud 28 in the direction of the arrow, and the foot piece 25 rests upon the periphery of the turn-table and prevents the same from rotating. This device has to be moved manually, and consequently the operator is obliged to be on hand when the record is exhausted and move the same.

My invention consists of automatic and adjustable means for operating such, or a similar device to the one described, and consists of a member j having a base 22 adapted to pass under the wings of f and be secured to the table with the screws 2, 2; and extending from the outer end of the base 22 is an upright arm 21 having at its outer end two lugs 35 to engage the end of a bar a secured thereto by a bolt l . This bar rests upon a bearing 24 on the arm 21, and extends over the turn-table and record-disk D towards its center, where it is integral with another bar i and preferably at an angle thereto.

Pivoted to the bar a by the screw c is a lever b having a short arm and a long arm; the short arm e is bent at its end to loop over or embrace the end of the lever k , while the end of the long arm 3 is curved outward and terminates in a knife edge. Near the juncture of the bars a and i is a lever g pivoted to the bar a by the screw 6; one of its arms is nicked at 4 to engage the end of lever 3, while the end of the other arm embraces the rod h supported in the bearings 9, 10 and 15 in the bar i . The rod h extending through the bearings 9, 10 and 15, is provided with a collar 20 and a spiral spring 8 between the bearings 9 and 10 and the end 5 of lever 6 embraces the rod between the collar and spring. The outer end of the rod h has a hole drilled therein which has an elongated opening on its side outward, and the end of the rod is slit and brought to a curved edge, and in this hole is a small rod 18 provided on its inner end with a spur or pointer 13, while its outer end termi-

nates preferably in a rubber tip 19. The rod 18 is adapted to fit tightly in the rod *h* and the split crimped end 17 adds to the resistance of moving the same. Upon each side of the opening 14 upon the bar *i* are graduations marked to indicate particular convolutions of the record and the pointer may be set opposite any one by moving the rod 18 and its end 19 will intercept the selected convolution which of course corresponds to the revolution of the turn-table. The bar *a* being pivoted, it can be turned over and away from the turn-table if desired.

It will be understood that the drawings are somewhat schematic, and are for the purpose of illustration.

In all of the devices of this character that I am aware of when the reproducer or stylus has run off the record it is allowed to run some distance further, which occasions a period of time in which objectional scraping noises are made, and the purpose of the invention is to avoid this and stop the turn-table immediately upon the termination of the record. As is well known, some records are necessarily of a few revolutions longer than others, but the maximum distance between the extremes is not perhaps more than twenty revolutions. I have, therefore, in the drawings shown the device to be adjusted but a comparatively short distance radially; the point of the stylus or reproducer is shown with its path in Fig. 1, and the turn-table is therefore represented as going towards the stylus.

The figures represent the turn-table B as moving and therefore the brake 25 is away therefrom and the rod 18 has its pointer 13 set to the gradation or revolution of the turn-table marked upon the bar *i* at which the record terminates and at which it is wished the same to be stopped, and consequently the end of the rod 18 projects from the rod *h* the proper distance so when the stylus or reproducer reaches the point desired it will strike the end 19 and force the rod *h* inward against the pressure of the spring 8, and turn the lever *g* in the direction of its arrow and away from the lever 3, which being unlatched allows the spring 32 to operate and force the stud 28 against the cam 29 of the lever *k* and open it, as shown in dotted lines in Fig. 4, in the direction of its arrow, and then bring the foot piece 25 against the edge of the turn-table and stop its motion.

It will be readily seen that the main features are an adjustable means capable of being placed in the path of the stylus at the ending of a record, whether it consist of few or many revolutions, combined with a brake device whereby the rotating turn-table is brought to a stop.

I claim as my invention:—

1. The combination in a sound-reproducing machine of a turn-table, a disk record

and a spring-projected brake, with a tripping device, and a reproducer or stylus, means for holding the brake retracted and for releasing the same to engage the turn-table, consisting of a lever adapted to lock with the brake and with the tripping device, the said device provided with an adjustable tip whereby the brake may be operated at any revolution of the turn-table.

2. The combination in a sound-reproducing machine of a reproducer or stylus a turn-table, a disk record, a brake adjacent to the turn-table, means for holding the brake retracted from the turn-table and for releasing the same, consisting of a main lever one end of which engages the brake lever a tripping device engaged by said main lever and an adjustable member adapted to be interposed in the path of the moving stylus.

3. The combination in a sound-reproducing machine of a reproducer or stylus a turn-table, a disk record, a brake adjacent to the turn-table, means for holding the brake retracted from the turn-table and for releasing the same at any revolution thereof, consisting of a main lever one end of which engages the brake lever a tripping device engaged by said main lever and an adjustable member adapted to be interposed in the path of the moving stylus.

4. The combination in a sound-reproducing machine of a reproducer or stylus a turn-table, a disk record, a brake adjacent to the turn-table provided with a locking and disengaging lever and a spring-operated foot-piece, means for holding the brake retracted from the turn-table and for releasing the same at any revolution thereof, consisting of a suitably supported main lever one end of which engages the brake lever, a tripping device engaged by said main lever and an adjustable member adapted to be interposed in the path of the moving stylus.

5. The combination in a sound-reproducing machine of a reproducer or stylus a turn-table, a disk record, a brake adjacent to the turn-table, means for holding the brake retracted from the turn-table and for releasing the same, consisting of a lever extending over the face of the turn-table, one end of which is adapted to lock the brake, a tripping device engaging the opposite end of said lever, having an adjustable member adapted to be interposed in the path of the moving stylus, and a graduated scale for adjusting the member.

6. The combination in a sound-reproducing machine of a reproducer or stylus a turn-table, a disk record, a brake adjacent to the turn-table having a spring-impelled foot-piece adapted to be retracted from the turn-table by a cam-lever, means for holding the cam-lever in a retracted position and for releasing the same, consisting of a suitably supported and pivoted lever extending over the

face of the turn-table, one end of which engages the cam-lever, a tripping device engaging the opposite end of the said lever having an adjustable member adapted to be set by means of a graduated scale adjacent thereto, at a determined position, to permit the moving stylus or reproducer to engage the same at any predetermined revolution of the turn-table.

7. The combination in a sound-reproducing machine of a reproducer or stylus a turn-table, a disk record, a brake having a spring-impelled foot-piece to engage the turn-table, a cam-lever adapted to retract the brake from the turn-table, a pivoted lever one end of which embraces the cam-lever, a latch device for holding the opposite end of said lever, automatic means for releasing the latch device consisting of a spring-operated rod having an adjustable tip adapted to be interposed in the path of the moving reproducer or stylus, as set forth.

8. The combination in a sound-reproducing machine of a reproducer or stylus a turn-table, a disk record, a brake having a spring-impelled foot-piece to engage the turn-table, a cam-lever adapted to retract the brake from the turn-table, a lever one end of which embraces the cam-lever, a latch device for holding the opposite end of said lever, automatic means for releasing the latch device at any revolution of the record consisting of a spring-operated rod having an adjustable member adapted to be interposed in the path of the reproducer or stylus, as set forth.

9. The combination in a sound-reproducing machine of a reproducer or stylus a turn-table, a disk record, a brake adapted to engage

the turn-table, means for releasing the brake and for stopping the rotation of the turn-table consisting of a bar attached to the machine and extending over the face of the turn-table, a pivoted main lever on the bar, one end of which is adapted to lock the brake in a retracted position, a tripping device supported by the bar engaging the other end of the lever, composed of a movable rod having an adjustable tip arranged to be placed in the path of the moving stylus in a predetermined position.

10. The combination in a sound-reproducing machine of a reproducer or stylus a turn-table, a disk record, a brake adapted to engage the turn-table, means for releasing the brake and for stopping the rotation of the turn-table consisting of a bar attached to the machine and extending over the face of the turn-table, a pivoted main lever on the bar one end of which is adapted to lock the brake in a retracted position, a tripping device supported by the bar engaging the other end of the lever composed of a spring-retracted rod having an adjustable tip, a short lever between the rod and the main lever, the spring-retracted rod arranged to be placed in the path of the moving stylus in a predetermined position.

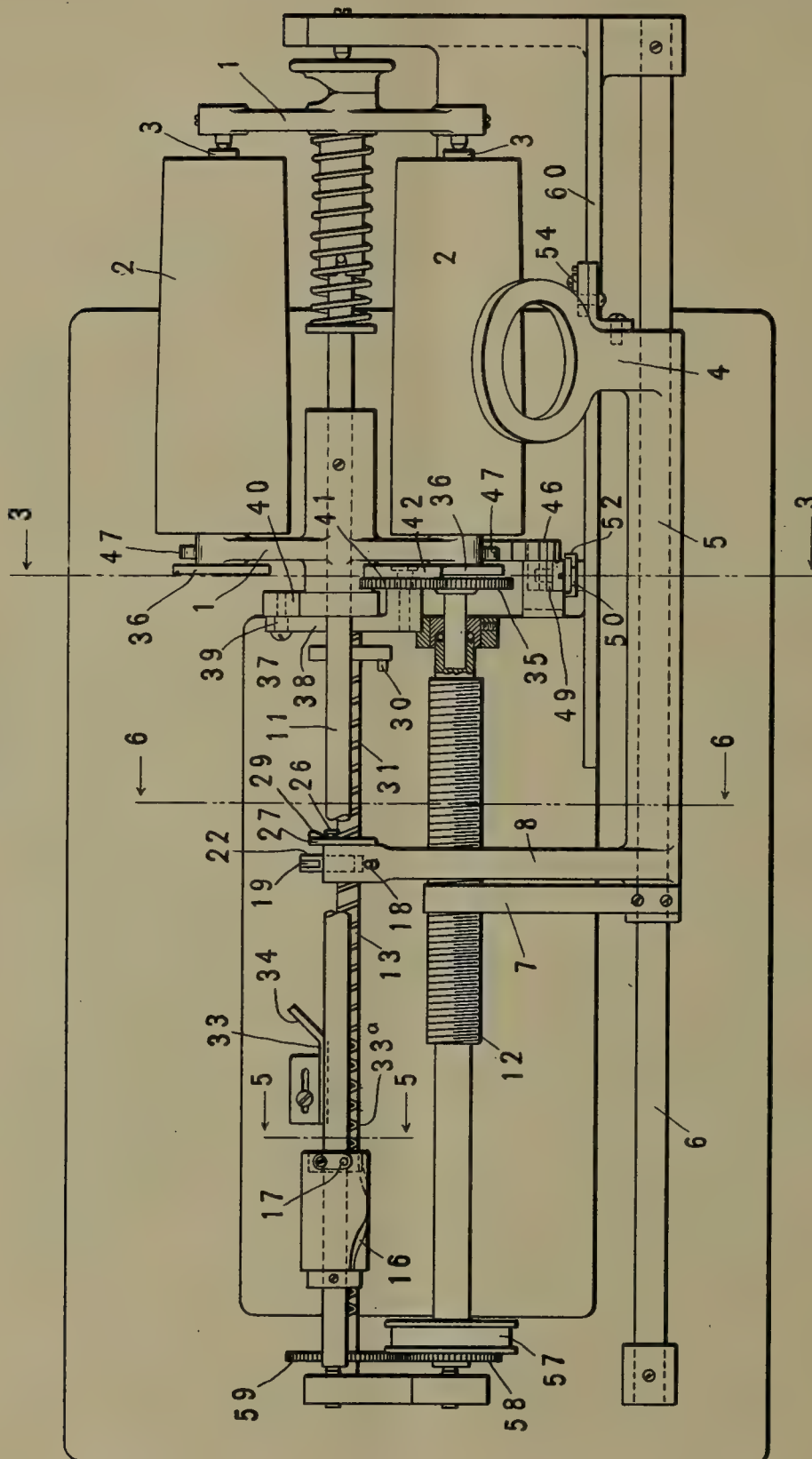
In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses, this 31st day of January 1908.

OSCAR F. FALK.

Witnesses:

W. P. CLARK,
L. W. MILLER.

FIG. 1—



Witnesses:
J. E. Kipley.
R. L. Stillman

Inventors,
 Charles Thoma Jr., and Walter Thoma.
 By their Attorneys
Prock Beeken Smith

Fig- 4-

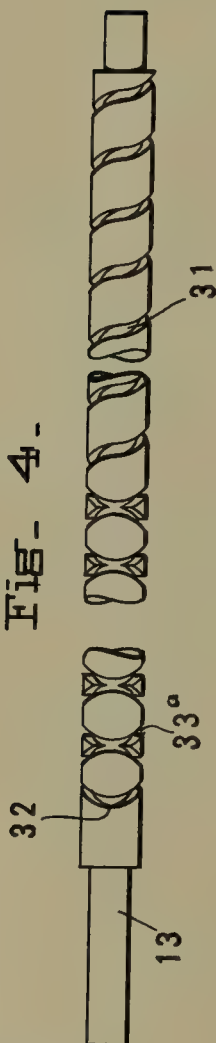


Fig- 2-

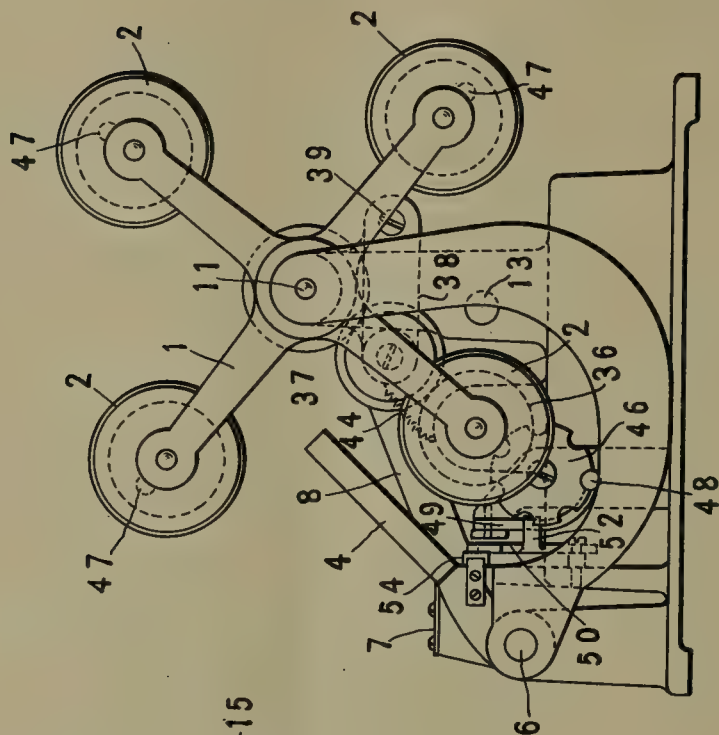


Fig- 5-

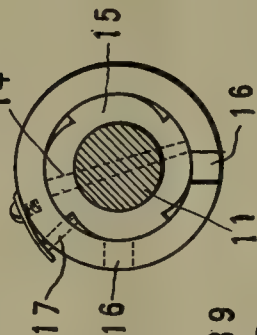
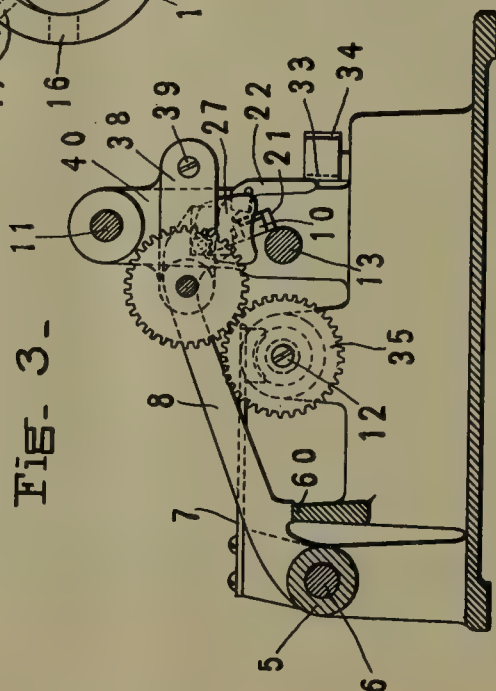
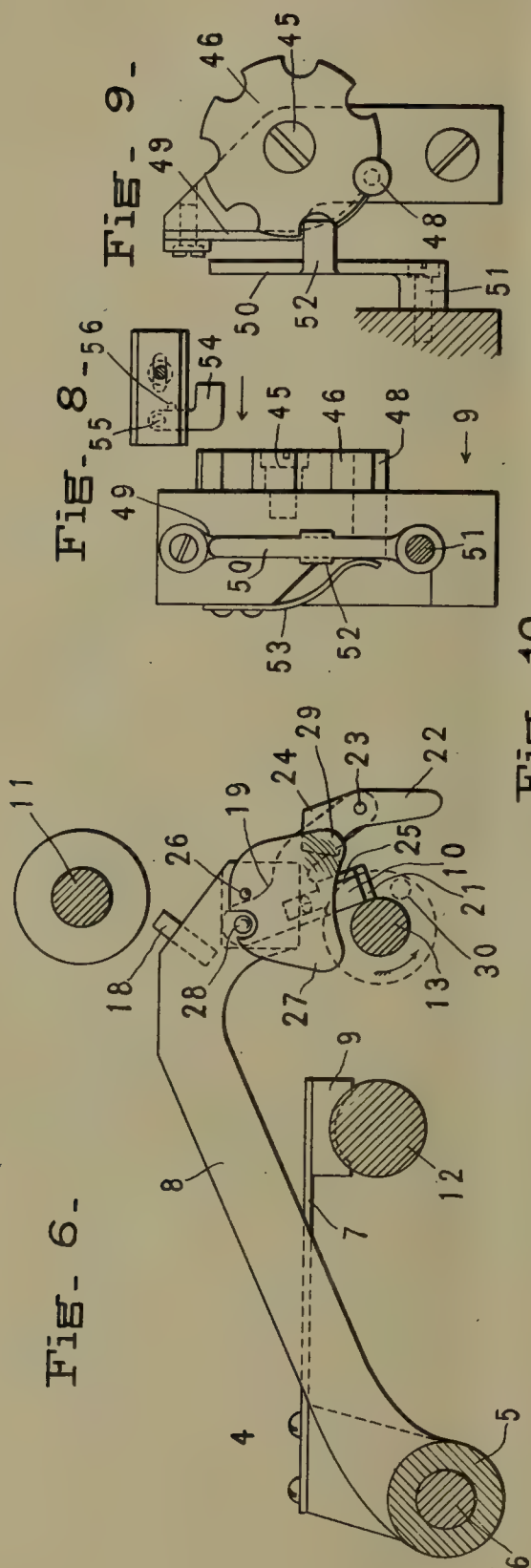


Fig- 3-



Witnesses
J. C. Taylor.
R. C. Stillman

Inventors
Charles Thoma, Jr. and Walter Thoma
By their Attorneys
Brock Beeken & Smith.



Witnesses
J. C. Kipley.
R. C. Stillman

Inventors
 Charles Thoma, Jr., and Walter Thoma.
 By their Attorneys
Brock Beeken & Smith

UNITED STATES PATENT OFFICE.

CHARLES THOMA, JR., AND WALTER THOMA, OF CARLSTADT, NEW JERSEY.

PHONOGRAPH.

No. 893,283.

Specification of Letters Patent.

Patented July 14, 1908.

Application filed January 10, 1908. Serial No. 410,104.

To all whom it may concern:

Be it known that we, CHARLES THOMA, JR., and WALTER THOMA, citizens of the United States, and residents of Carlstadt, in the county of Bergen and State of New Jersey, have invented certain new and useful Phonographs, of which the following is a specification.

The present invention relates generally to phonographs or other sound reproducing machines, and has more particularly reference to a multi-record or repeater phonograph such as is disclosed in Letters Patent No. 873,969 of December 17, 1907.

The main object of the invention is the production of a machine, automatic throughout, and reliable in its operation.

One of the features of this invention resides in providing a rotatable alinement device mounted independently of the record carrier and in peripheral engagement therewith. A suitable locking device is employed adapted to engage with the alinement device, and means are provided for releasing the locking means after each sound reproducing period so that the rotation of the record carrier will move the alinement device a sufficient distance to position a new record after which the locking device locks the alinement device again. In the preferred embodiment the sound reproducing mechanism is utilized to release the locking device and to turn the record carrier.

In order, however, to allow for slight discrepancies, due to lost motion or wear, we employ an intermediate driving mechanism for operating the individual records which will compensate for discrepancies in size or positioning of the parts.

The intermediate driving mechanism is carried on the free end of an arm which is loosely pivoted at the other end. This intermediate driving mechanism rests on and is in engagement with transmission mechanism on the driving shaft and is adapted to engage with transmission mechanism on the records as they are successively presented thereto. The intermediate driving mechanism is thus held yieldingly in engagement with its co-operating members whereby discrepancies in size and position of the parts are compensated for.

Other features of construction will appear as the specification proceeds.

In the accompanying drawings, the invention is embodied in a concrete and preferred

form, but changes of construction may of course be made without departing from the legitimate and intended scope of the invention.

In the said drawings: Figure 1 is a plan view of a phonograph embodying the invention. Fig. 2 is an end view of Fig. 1. Fig. 3 is a transverse sectional view on the line 3—3 of Fig. 1. Fig. 4 is a detail view of the double reversely threaded repeater screw. Fig. 5 is a transverse sectional view on the line 5—5 of Fig. 1. Fig. 6 is a transverse sectional view on the line 6—6 of Fig. 1. Fig. 7 is a view similar to Fig. 6 but showing the parts in a different position, and partly broken away. Fig. 8 is a detail view of the locking device and releasing means. Fig. 9 is a detail view of the locking device looking in the direction of the arrow 9 in Fig. 8. Fig. 10 is a sectional detail view on the line 10—10 of Fig. 7. Fig. 11 is a detail view of the intermediate driving device and adjacent elements. Fig. 12 is a detail view in perspective of the locking pin which engages with the Geneva stop wheel.

Similar characters of reference indicate corresponding parts in the different views.

1 indicates an intermittently rotatable record carrier holding a plurality of records which are supported on the spindles 3.

4 denotes the sound reproducing mechanism the main supporting part of which is in the form of a sleeve 5 sliding on the shaft 6. As here shown the sound reproducing mechanism carries two arms 7 and 8, one of which is provided with the fine thread follower 9, and the other of which carries a second or repeater thread follower 10. The record carrier is mounted on the shaft 11, while 12 and 13 indicate respectively the main drive or feed screw shaft and the double reversely threaded repeater screw shaft. Mounted fast on the shaft 11 by means of the key 14 is a ratchet 15. Surrounding this ratchet is a loose sleeve having the cam groove 16 and provided with the spring seated pawl 17 adapted to engage with the teeth of the ratchet when turned in one direction and to ride idly over the teeth when turned in the other direction.

18 indicates a removable pin on the arm 8 of the sound reproducing mechanism, adapted to enter the cam groove 16 to turn the sleeve.

Mounted on the arm 8 is a pivoted lever 19 on which is swiveled, by means of the uni-

versal joint 20, the thread follower 10. The thread follower 10 has a tooth 21 which enters the threads of the repeater screw. Mounted on the lever 19 is a loose tail 22 here shown as a bifurcated lever pivoted at 23. The arms 24 of this tail are adapted to embrace the projection 25 of the follower 10 when the latter is being disengaged from the repeater screw to prevent the said follower from taking the other thread, and thus reversing the motion instead of disengaging.

26 indicates a stop limiting the outward movement of the lever 19.

27 indicates a nose mounted on the pin 26 and having its movement limited by the pin 28, on which latter the lever 19 is mounted. This nose is allowed a certain amount of lateral play and has an outwardly turned projection 29 at its lower end.

When the sound reproducing mechanism comes to the end of its forward stroke, the trip 30 on the repeater screw will engage with the projection 29 of the nose 27. The advance of the reproducing mechanism is very gradual owing to the fine threads of the feed screw, but the trip 30 need only engage the nose 27 very slightly since the latter will be turned sidewise owing to the fact that it is loosely mounted and the trip 30 will therefore be able to get a good grip under the projection 29 thereby lifting the arm 8 and the sound reproducing mechanism. In case the trip does not engage the nose 27 sufficiently the latter will merely slip off without disturbing the advance of the reproducer and on the next turn the latter will have moved forward sufficiently to enable the trip to properly engage the nose 27. When the arm 8 is thus lifted the thread follower 10 will slide into engagement with the thread 31 of the repeater screw; the weight of the parts causing the lever 19 to turn around its pivot to effect this. The sound reproducer will now be moved back and this motion will continue until the thread follower encounters the cam surface 32 of the repeater screw which will turn the follower around its swivel and guide it into the reverse thread 33^a of the screw. The advance movement of the reproducer is thus commenced. During the return stroke of reproducer the lower end of the tail 22 will have been moved inward by the cam 33. This, however, has no effect on the parts. Upon the forward stroke of the reproducer, the tail 22 will pass on the other side of the cam 33 and when the surface 34 is encountered the lower end of the tail 22 will move outward thereby causing the arms 24 to engage the projection 25 of the follower 10 thereby holding it from turning on its swivel. The tail can therefore move no further, independently, and the motion is then continued around the center 28 with the result that the follower is moved sidewise off the repeater screw. This causes the arm 8 and

the reproducer to descend, whereby the follower 9 will engage with the feed screw 12. On the end of the shaft or screw 12 is a gear 35, and on the end of each record is a friction roll 36.

37 indicates an intermediate driving mechanism mounted on the free end of the arm 38 pivoted at 39 on the bracket 40. This intermediate driving mechanism consists of a gear 41 adapted to engage with the gear 35 on the shaft 12, and a friction roll 42 adapted to engage with the friction roll 36 as they are successively brought into contact therewith. The gear 41 and roll 42 are mounted on the same stud 43 and move together. The intermeshing teeth of the gears 35 and 41 should be long enough to allow the friction rolls 36 and 42 to be always in engagement notwithstanding any yielding movement of the intermediate device due to discrepancies in size or position of the parts. The weight of the intermediate driving mechanism will usually be sufficient to maintain contact, but if desired a spring 44 may be employed. The rotatable alinement device and the locking means therefor are constructed as follows: Mounted on the stud 45 is the Geneva stop wheel 46 adapted to be turned at intervals by the projections 47 on the record carrier. When the carrier is turned, the projection 47 in engagement with the Geneva stop wheel will turn it part way, and the next projection 47 will turn it the remainder of the distance until a locking device, to be described, acts to lock the parts. Each step of the record carrier is sufficient to bring the next record to be played into engagement with its driving means.

48 is a locking pin adapted to engage with the notches on the Geneva wheel as they are brought into alinement therewith. This locking pin is carried by the pivoted lever 49. This lever is adapted to be moved by another lever 50 pivoted at 51 and provided with the two arms 52 engaging the lever 49. A spring 53 bears against the lever 50 and serves to hold the locking pin 48 in engagement with the Geneva stop wheel, or serves to move the said pin into engagement therewith when a notch of the said wheel comes into alinement therewith. Means for releasing the locking device are provided taking the form of a trip 54, in this instance carried by the sound reproducing mechanism. This trip is pivoted at 55 and has a stop 56 which holds it from moving out of the way when it encounters the lever 50 on the return stroke of the sound reproducing mechanism. When this trip engages with the lever 50 on the return stroke of the reproducer the pin 48 will be withdrawn from engagement with the Geneva stop wheel, and the record carrier is free to turn the said wheel. On the forward stroke the trip 54 will ride idly over the lever 50.

The operation is as follows: During the sound reproducing period, the pin 48 is locked with the Geneva stop wheel and the record carrier is prevented from turning.

5 One of the records is rotated by the intermediate driving mechanism, the stylus (not shown) is in engagement with the record which is rotated, and the sound reproducing mechanism is advancing on its forward stroke by the thread follower 9 engaging with the feed screw shaft 12. As the sound reproducer comes to the end of its stroke the trip 30 will engage the nose 27 thereby lifting the sound reproducing mechanism up, bringing the follower 9 out of engagement with the feed screw shaft 12 and disengaging the stylus from the record being played. By reason of its own weight the thread follower 10 will slide into engagement with the thread 31 of the repeater screw and the sound reproducing mechanism will commence its return movement. As it travels back the trip 54 will release the locking device, and the pin 18 will enter the cam groove 16 thereby turning the record carrier and bringing another record into engagement with its individual driving means. The locking device will then lock the Geneva stop wheel and record carrier. When the follower 10 reaches the cam surface 32 in the repeater screw the motion will be reversed and the sound reproducing mechanism will start forward again. On its forward stroke the tail 22 will pass on the outside of the cam 33 and when the surface 35 34 is encountered the tail 22 will clasp the follower 10 to prevent it from turning, after which the said follower will slide out of the thread 33^a thereby lowering the sound reproducing mechanism and causing the follower 9 to engage with the feed screw 12 and the stylus to engage the record to be played. If the pin 18 is removed the machine will not turn the carrier and the record already played will be repeated. Motion is imparted to the device by means of the pulley 57 on the main shaft 12. From there the motion is transferred to the repeater shaft by means of gears 58 and 59. When in its downward position, the sound reproducing mechanism is partially supported on the rail 60.

We claim:

1. In a phonograph, an intermittently rotatable record carrier holding a plurality of records, means for imparting an individual rotation to the records as they are successively presented thereto, a rotatable alinement device, mounted independently of the record carrier and in peripheral engagement therewith, adapted to properly aline the individual records with the means for individually rotating them, a locking device adapted to engage with the alinement device, means for releasing the locking device, and means for turning the record carrier.

65 2. In a phonograph, an intermittently ro-

tatable record carrier holding a plurality of records, means for imparting an individual rotation to the records as they are successively presented thereto, a sound reproducing mechanism, means for reciprocating the sound reproducing mechanism, a rotatable alinement device, mounted independently of the record carrier and in peripheral engagement therewith, adapted to properly aline the individual records with the means for individually rotating them, a locking device adapted to engage with the alinement device, means carried by the sound reproducing mechanism for releasing the locking device, and means also carried by the sound reproducing mechanism for turning the record carrier.

3. In a phonograph, an intermittently rotatable record carrier, a rotatable Geneva stop wheel mounted independently of the record carrier and in peripheral engagement therewith, a locking device adapted to engage with the Geneva stop wheel, means for releasing the locking device, and means for turning the record carrier.

4. In a phonograph, an intermittently rotatable record carrier, a sound reproducing mechanism, means for reciprocating the sound reproducing mechanism, a rotatable Geneva stop wheel mounted independently of the record carrier and in peripheral engagement therewith, a locking device for engaging with the Geneva stop wheel, means carried by the sound reproducing mechanism for releasing the locking device, and means also carried by the sound reproducing mechanism for turning the record carrier.

5. In a phonograph, an intermittently rotatable record carrier holding a plurality of records, means for imparting an individual rotation to the records as they are successively presented thereto, a sound reproducing mechanism, a locking device, an alinement device in engagement with the locking device and operated by the record carrier adapted to properly aline the individual records with the means for individually rotating them, driving connections for reciprocating the sound reproducing mechanism, and means for releasing the locking device and for turning the record carrier, both carried by the sound reproducing mechanism.

6. In a phonograph, an intermittently rotatable record carrier holding a plurality of records, means for turning said record carrier, means for imparting an individual rotation to the records as they are successively presented thereto, an alinement device adapted to properly aline the individual records with the means for individually rotating them, means for locking the alinement device, means for releasing the locking means, a plurality of members on the record carrier, one of which is in engagement with the alinement device when in its locked position, the

said member acting to turn the alinement device a distance, when the record carrier is actuated and when the locking means are released, after which it is released from engagement therewith, and another of said members engaging with the alinement device to turn the same until the locking device locks the alinement device in position.

7. In a phonograph, an intermittently rotatable record carrier, means for turning said record carrier, a Geneva stop wheel, means for locking the Geneva stop wheel, means for releasing the locking means, a plurality of members on the record carrier, one of which is in engagement with the Geneva stop wheel when in its locked position, the said member acting to turn the Geneva stop wheel a distance, when the record carrier is actuated and when the locking means are released, after which it is released from engagement therewith, and another of said members engaging with the Geneva stop wheel to turn the same until the locking device locks the Geneva stop wheel in position.

8. In a phonograph, a driving shaft, an intermittently rotatable record carrier, individually rotatable records mounted thereon, transmission mechanism on the shaft and on the ends of the records, and an intermediate driving mechanism comprising an arm loosely pivoted at one end and provided with transmission mechanism at its free end; the said transmission mechanism on the arm resting and engaging with the transmission mechanism of the shaft and adapted to engage with the transmission mechanism on the records as they are successively presented thereto.

9. In a phonograph, a driving shaft, an intermittently rotatable record carrier, individually rotatable records mounted thereon, transmission mechanism on the shaft and on the ends of the records, and an intermediate driving mechanism yieldingly supported for transmitting motion from the driving shaft to the records as they are successively presented thereto.

10. In a phonograph, a driving shaft, an intermittently rotatable record carrier, indi-

vidually rotatable records mounted thereon, transmission mechanism on the driving shaft and on the ends of the records, and an intermediate driving mechanism in constant engagement with the transmission mechanism on the shaft and adapted to be engaged by the transmission mechanism on the ends of the records as they are successively presented thereto, and means for yieldingly supporting the said intermediate driving mechanism so as to compensate for discrepancies in size or position of parts.

11. In a phonograph, an intermittently rotatable record carrier, a Geneva stop wheel, means on the carrier for engaging with the Geneva stop wheel to turn the same, means for locking the Geneva stop wheel, and means for releasing the locking means.

12. In a phonograph, an intermittently rotatable record carrier, a Geneva stop wheel, means on the carrier for engaging with the Geneva stop wheel to turn the same, means for locking the Geneva stop wheel, a sound reproducing mechanism adapted to engage with one of the records of the carrier while the latter is locked, and means carried by the sound reproducing mechanism for releasing the locking means.

13. In a phonograph, an intermittently rotatable record carrier, a Geneva stop wheel, means on the carrier for engaging with the Geneva stop wheel to turn the same, means for locking the Geneva stop wheel, a sound reproducing mechanism adapted to engage with one of the records of the carrier while the latter is locked, and means carried by the sound reproducing mechanism for releasing the locking means, and means also carried by the sound reproducing mechanism for turning the record carrier.

Signed at New York city in the county of New York and State of New York this 8th day of January A. D. 1908.

CHARLES THOMA, JR.
WALTER THOMA.

Witnesses:

AXEL V. BEEKEN,
GEO. A. MARSHALL.

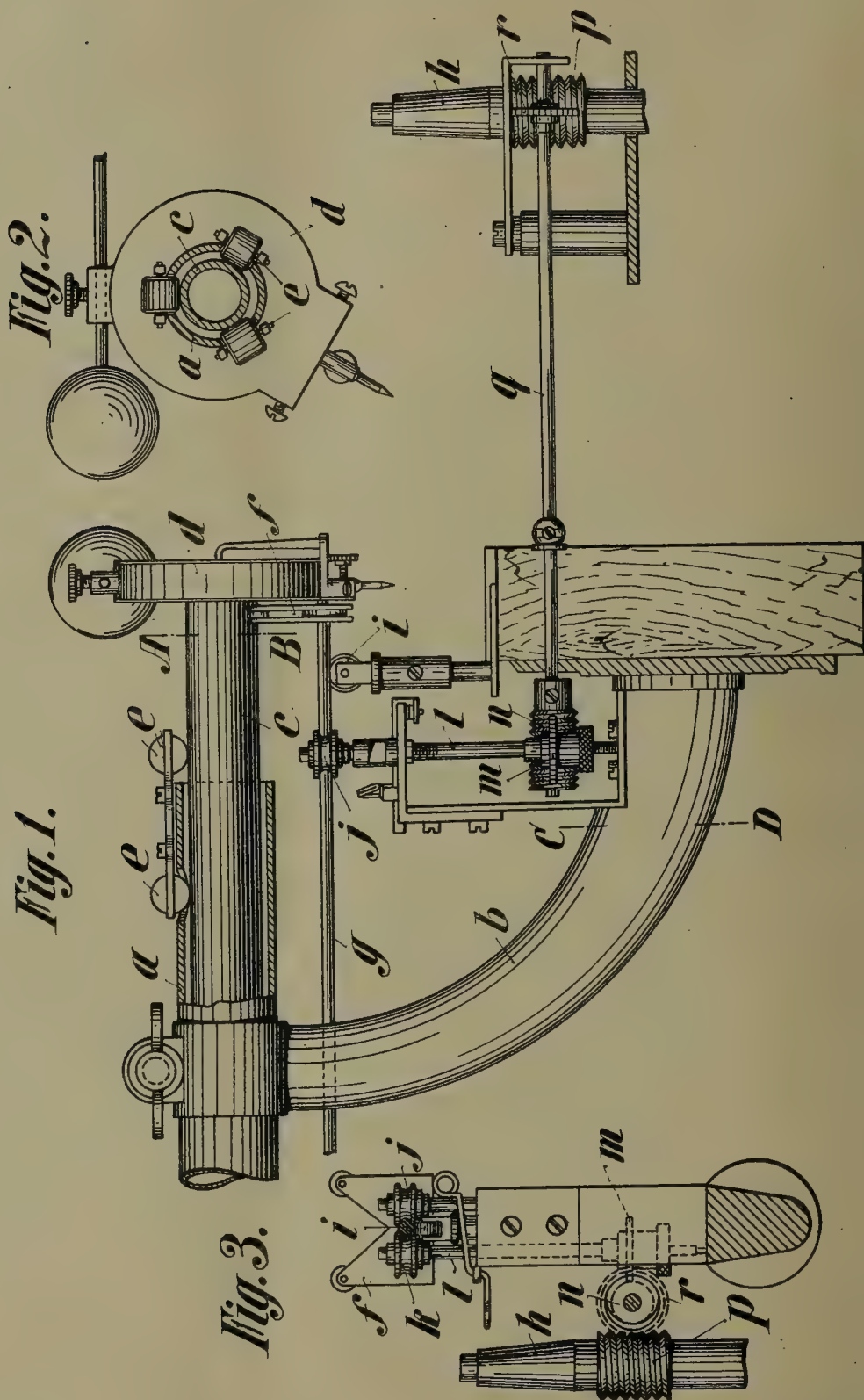
No. 893,292.

PATENTED JULY 14, 1908.

G. A. WLOST.

FEEDING MECHANISM FOR TALKING MACHINES.

APPLICATION FILED DEC. 13, 1906.



WITNESSES:

Ired White
Rene' Ruine

INVENTOR:

Gustav Adolf Wlost.

By his Attorneys

Arthur C. Fraser & Co.

UNITED STATES PATENT OFFICE.

GUSTAV ADOLF WLOST, OF SCHRAMBERG, GERMANY, ASSIGNOR TO FIRM OF VEREINIGTE UHRENFABRIKEN VON GEBRÜDER JUNGHANS & THOMAS HALLER, A. G., OF SCHRAMBERG, GERMANY.

FEEDING MECHANISM FOR TALKING-MACHINES.

No. 893,292.

Specification of Letters Patent.

Patented July 14, 1908.

Application filed December 13, 1906. Serial No. 347,682.

To all whom it may concern:

Be it known that I, GUSTAV ADOLF WLOST, a subject of the King of Prussia, residing at Uhlandstrasse 13, in Schramberg, Germany, have invented certain new and useful Improvements in Feeding Mechanism for Talking-Machines, of which the following is a full, clear, and exact description.

This invention relates to feeding mechanism for talking machines wherein the diaphragm supporting tube can slide on roller guides without any articulation in a tube connected to the sounding trumpet.

In order that with such feeding mechanism the sliding or forward movement of the diaphragm tube may take place independently of the record grooves of the record disks, the diaphragm tube according to the present invention is moved forwards by means of a slide operated by the driving gear of the machine, said movement being of course always such that the feed of the diaphragm and style conforms with the spiral of record grooves on the record disk.

The accompanying drawing shows a form of construction of the present transporting device.

Figure 1 is a side elevation with partial section; Fig. 2 is a section on line A—B and Fig. 3 is a section on line C—D of Fig. 1.

The tube *a* bearing the sounding trumpet in the usual manner is adjustably mounted in a bracket arm *b* fastened to the box of the talking machine. In this tube *a* extends the tube *c* at the outer end of which is secured the part *d* supporting the diaphragm. The tube *c* slides on rollers *e* extending on the one hand through recesses of the tube *a* and bearing on the other hand on the tube *c* outside the tube *a*. The tube *c* bears on its diaphragm supporting end upon a slide which, as shown, comprises the bracket *f* provided with rollers or rotary disks and the guide bar *g*. The

latter moves within the bracket arm *b* and is supported in its forward part by a roller *i*. It moves between two friction rollers *j* and *k*, the latter of which is arranged on a readily interchangeable shaft *l*. There is mounted on this shaft a removable worm wheel *m* engaging in a worm *n* set in rotation from the driving gear of the machine. The driving motion of the worm may be derived from the driving gear in such a manner that the spindle *h* receiving the record disk is likewise provided with a worm *p* where in the correspondingly lengthened shaft *a* of the worm *n* engages by means of the worm wheel *r*. The gear is proportioned in such a manner that the feed of the slide and diaphragm supporting tube *c* conforms with the actual spiral of record grooves of the record disk. As these grooves in the various manufactured types of disks are sometimes close together and sometimes wide apart, shaft *l* and worm wheel *m* have been made readily interchangeable in such a manner that the feed of the diaphragm may be readily adapted to the actual type of disk by mounting a suitable worm wheel thereon.

What I claim as my invention, and desire to secure by Patent is:

In a talking machine, the combination of a diaphragm, and means for moving said diaphragm including friction rollers and means for driving said friction rollers including worm gearing having an intermediate shaft *l* and worm wheel *m*, and means for mounting such shaft and wheel so that they may be easily removed.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

GUSTAV ADOLF WLOST.

Witnesses:

ERNST ENTENMANN,
WM. HAHN.

No. 893,525.

PATENTED JULY 14, 1908.

J. M. LANDON.
TALKING MACHINE.
APPLICATION FILED APR. 17, 1908.

Fig. 1.

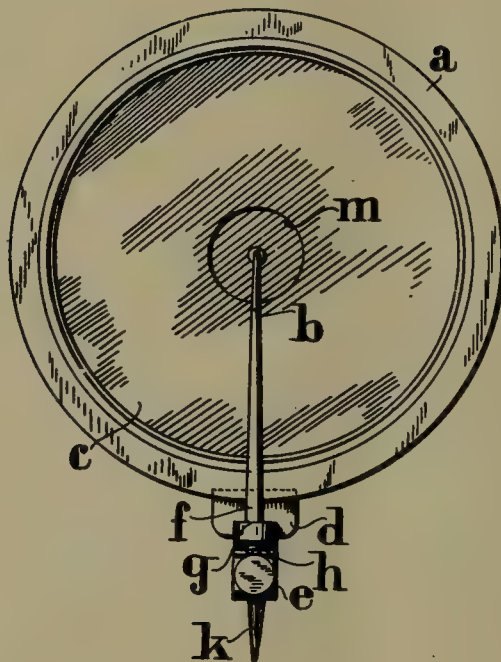
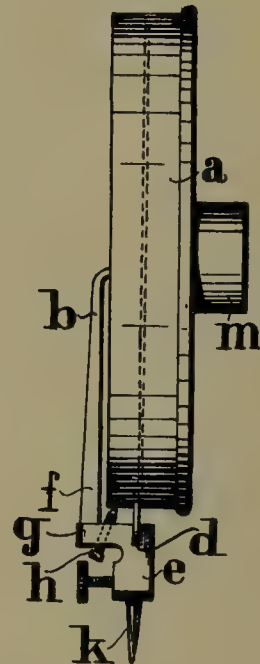


Fig. 2.



Witnesses:
F. R. Pitton.
J. E. Costa.

Inventor,
Joseph M. Landon
By William, John & Witherington
his Attorneys

UNITED STATES PATENT OFFICE.

JOSEPH MARGULIES LANDON, OF LONDON, ENGLAND.

TALKING-MACHINE.

No. 893,525.

Specification of Letters Patent.

Patented July 14, 1908.

Application filed April 17, 1908. Serial No. 427,761.

To all whom it may concern:

Be it known that I, JOSEPH MARGULIES LANDON, a subject of the King of England, residing at 20 Central Hill, in the county of London, England, have invented certain new and useful Improvements in or Relating to Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention consists in improvements in or relating to talking machines and refers particularly to the sound boxes for recording or reproducing.

According to this invention, I provide spring mechanism of such a character in connection with the sound box that although the spring is rigidly held in position it is not controlled in such a way as to minimize its action and render it insensible to the slightest vibrations of the stylus, while at the same time the mechanism is not too sensitive so as to cause over vibration or "blasting".

In carrying out my invention, I fix to the shell of the sound box one edge of a flat spring, in such a way that the spring is in the same plane as the diaphragm; the other edge of the spring over which the stylus bar is connected is left free to move. The flat spring may be formed of steel, or of any other springy metal or material, such for instance as brass, glass, mica or the like. I may connect the sound box thus constructed to the end of the trumpet or to the tone arm or the like by any suitable means. And in order that my said invention may be better understood I will now proceed to describe the same with reference to the drawing accompanying this specification, in which:—

Figure 1 shows front view of a sound box constructed according to my invention; Fig. 2 shows side view of same.

The same letters of reference are employed to denote the same parts in both the views:—

a shows the shell of the sound box, *b* shows the inner end of the stylus bar, which is fixed to the diaphragm *c* in any suitable manner.

d shows a flat spring, one edge of which is fixed in the shell *a* of the sound box, the other edge being fixed in a stylus holder *e*. The end *f* of the stylus bar is fixed to an extension *g* of the stylus holder *e*.

h shows a screw to screw against the shell *a* of the sound box.

k shows the stylus and *m* the sound exit tube.

The form of the device shown in the accompanying drawing wherein the stylus *k*, the flat spring *d* and the diaphragm *c* are all in the same plane, is the one which I have found to answer best in practice, but the details of carrying out the invention may be varied somewhat without departing from the principle thereof.

In place of using a regulating screw *h* I may use a pin or peg or its equivalent for the same purpose.

What I claim and desire to secure by Letters Patent of the United States of America, is:—

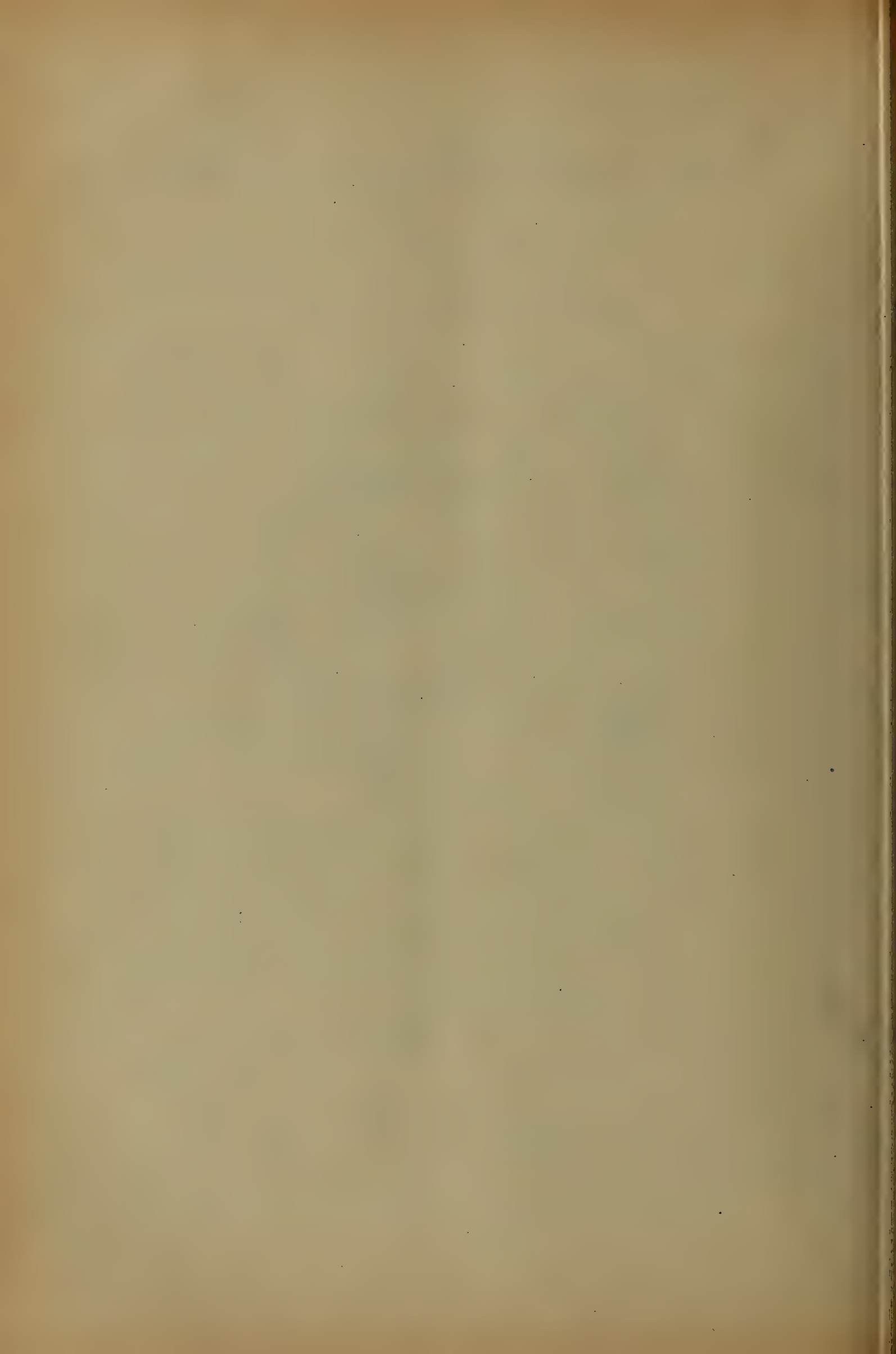
In a sound box, the combination of a suitable frame; a diaphragm mounted therein; a stylus bar connected to said diaphragm; a flat spring connected directly to said frame and lying in the same plane as the diaphragm; a stylus holder with which said spring is also connected, and provided with an extension in which one end of said stylus bar is fixed; and a screw passing through said extension and adapted to contact with the shell of the sound box, substantially as described.

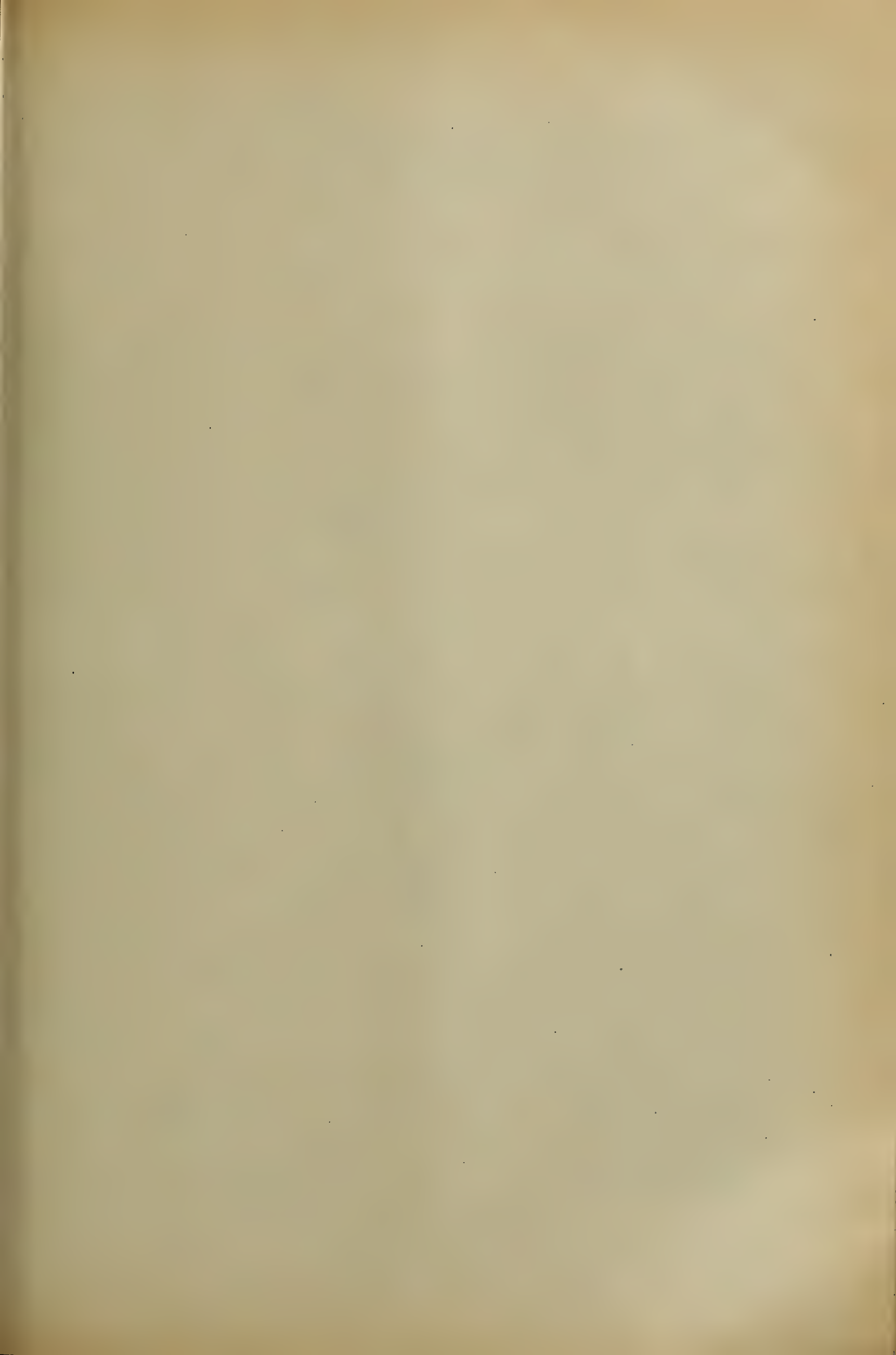
In testimony whereof, I affix my signature, in presence of two witnesses.

JOSEPH MARGULIES LANDON.

Witnesses:

A. E. VIDAL,
L. SIMMONDS.





No. 893,929.

PATENTED JULY 21, 1908.

G. KÖNIGSTEIN.
AUTOMATIC NEEDLE CLAMP FOR TALKING MACHINES.
APPLICATION FILED SEPT. 4, 1907.

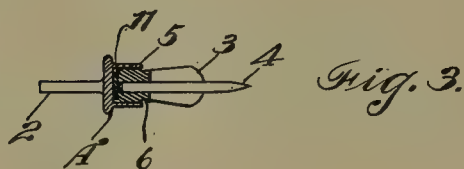
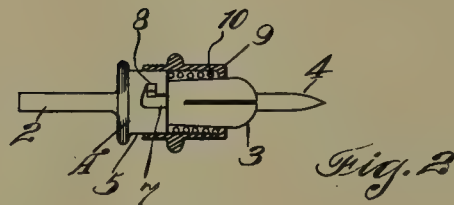
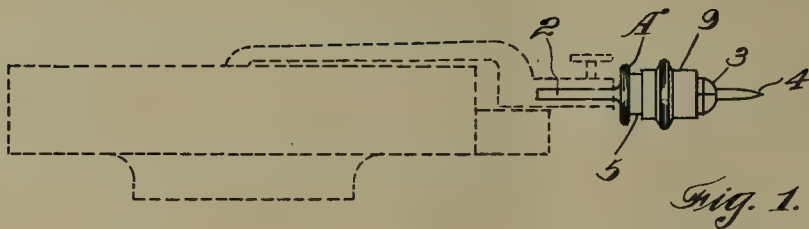


Fig. 4.



Fig. 5.

Witnesses;

A. E. Maynard.
J. H. Jones

Inventor;
Gabor Königstein;

By Geo. H. Strong.
Attorney

UNITED STATES PATENT OFFICE.

GABOR KÖNIGSTEIN, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO D. H. GULICK, OF SAN FRANCISCO, CALIFORNIA.

AUTOMATIC NEEDLE-CLAMP FOR TALKING-MACHINES.

No. 893,929.

Specification of Letters Patent.

Patented July 21, 1908.

Application filed September 4, 1907. Serial No. 391,331.

To all whom it may concern:

Be it known that I, GABOR KÖNIGSTEIN, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Automatic Needle-Clamps for Talking-Machines, of which the following is a specification.

My invention relates to attachments for talking machines, and especially to an automatic needle clamp. Its object is to provide a simple, cheap, practical attachment which can be applied to any talking machine already in use; and which will permit a needle to be put in or taken out without the use of thumb-screws, and which will provide for the seating of the needle in such fashion that either a soft tone or a loud tone may be obtained from the same needle.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is an elevation showing the invention applied to an ordinary sound-box and stylus-bar. Fig. 2 is a sectional view of the invention, enlarged. Fig. 3 is a sectional view of the same omitting the clamping sleeve. Fig. 4 is an end view of the sleeve. Fig. 5 is a like view of the clamp.

A is a head of suitable size, shape and material, having a stem 2 by which it can be inserted into the socket of any ordinary sound-box, and secured therein by the usual set screw. Manifestly, though, this head could be made integral with the stylus-arm. This head carries the spring-jaw members 3 which normally tend to open outward, but which may be compressed to grip and hold a needle point, as 4, when the latter is inserted into the clamp-jaws 3.

The main feature of the invention resides in the use of the spring-jaws 3, and in suitable means for compressing them to grip the needle point, or opening them to release the needle point; in conjunction with the tone-qualifying means, hereinafter stated.

The jaws 3 may be secured to the head in a suitable manner and various devices may be employed to operate the clamp-jaws 3. In the present instance, I have shown a barrel

member 5 secured to the head A, and adapted to detachably receive the base ring 6 to which the spring-jaws are fixed; the barrel 5 having a suitable bayonet slot 7 to receive the lug 8 on the ring 6. The opening and shutting of the jaws is done by the spring-actuated sleeve 9. When the sleeve is pushed in to compress its spring 10, it allows the clamp members 3 to open and release the needle point. Releasing the hold on the sleeve 9 allows the spring 10 to act to close the jaws and grip the needle point.

The clamp-jaws 3 are preferably connected at their inner ends to the cylindrical ring portion 6 which, as before stated, is detachably connected to the barrel or socket 5 on the head A so as to permit the ready removal of the jaws, whereby either a felt washer or a silver washer, as indicated at 11, may be inserted into the socket, and against which washer the needle will seat; one or the other of these washers, either felt or metal, being used, respectively, according as to whether it is desired to play soft or loud. The idea of using an interchangeable felt or metal washer is important, because thereby I have, in addition to my automatic clamp feature, a simple and convenient means for softening or expanding or amplifying the tones.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

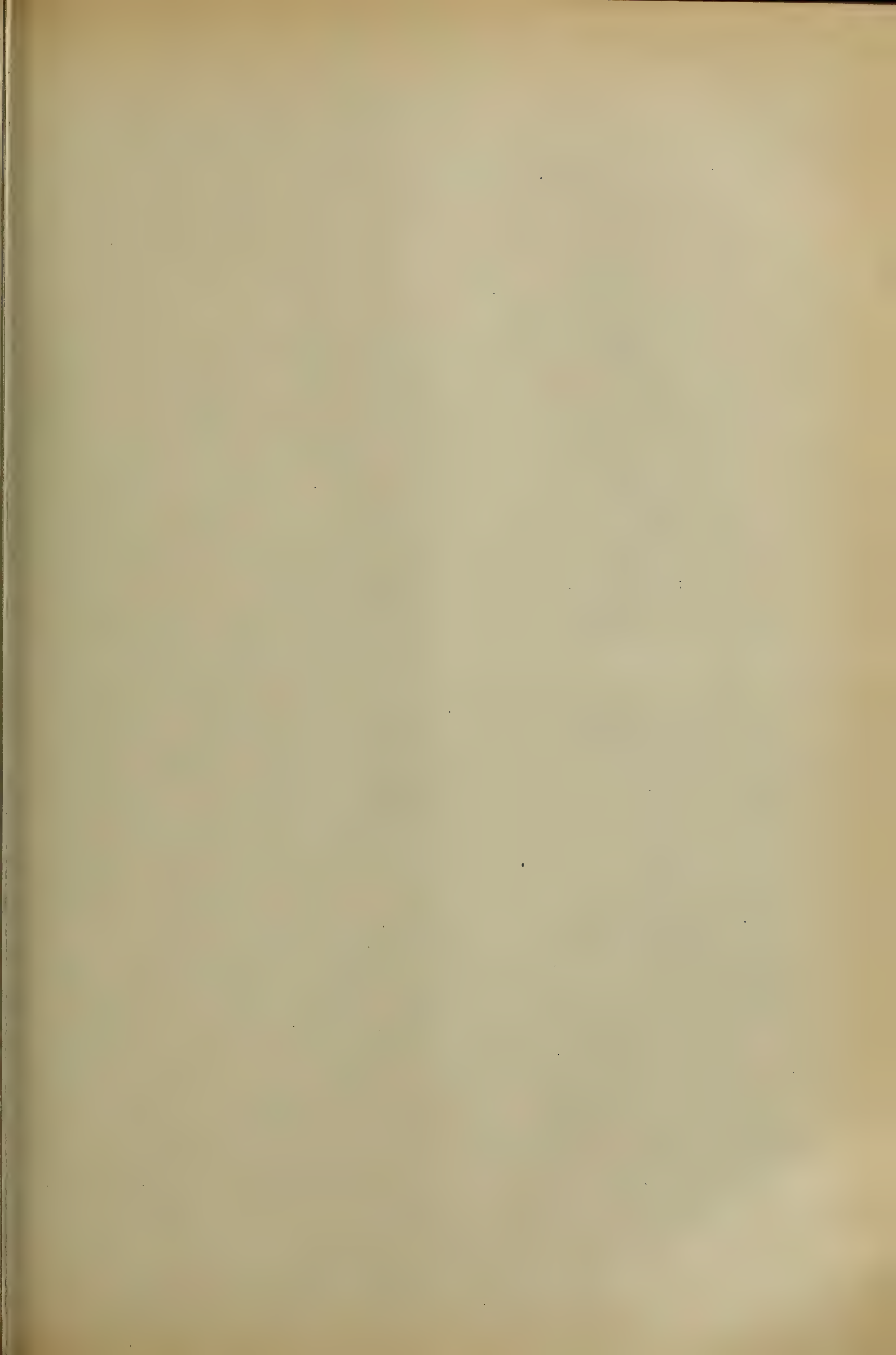
An automatic needle clamp for talking machines, consisting of a head having a stem for attachment to an ordinary sound-box, said head provided with a barrel portion, spring clamp members secured to a base ring which detachably fits the inside of the barrel, a spring-actuated sleeve slidable on the outside of the barrel and operative on the clamp members to hold the latter normally closed, a needle point carried by the clamp members, and a tone-qualifying washer inserted into the barrel and against which the back of the needle impinges.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GABOR KÖNIGSTEIN.

Witnesses:

HERMAN HAHN,
GEO. H. STRONG.



A. JUNOD.
SOUND REPRODUCER AND RECORDER.

APPLICATION FILED JULY 15, 1907.

4 SHEETS—SHEET 1.

Fig. 1.

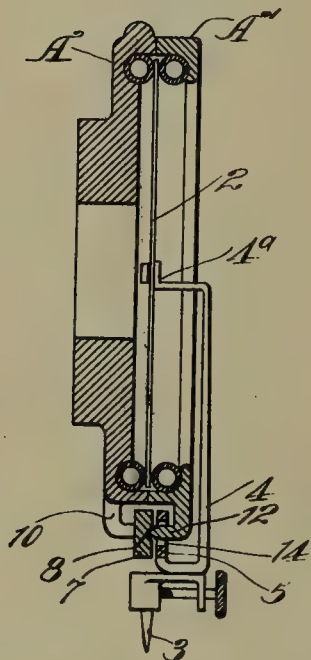


Fig. 2.

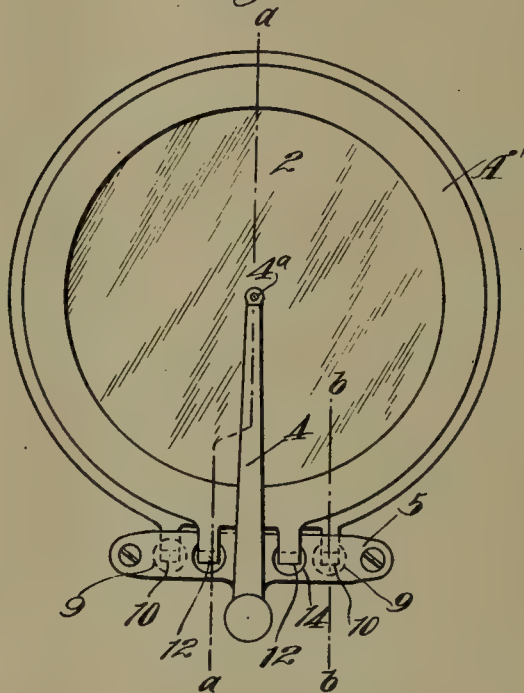


Fig. 3.

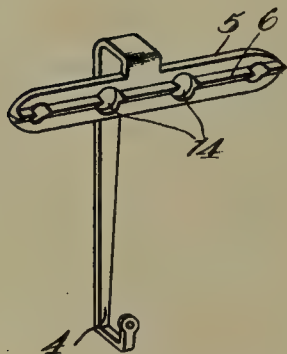


Fig. 4.

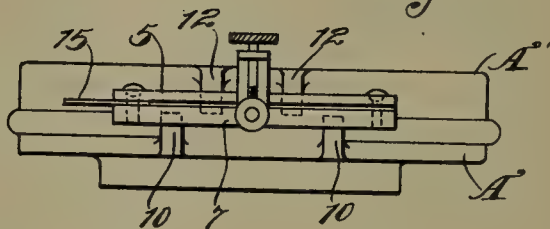
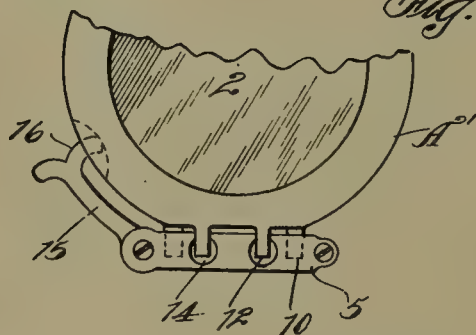


Fig. 5.



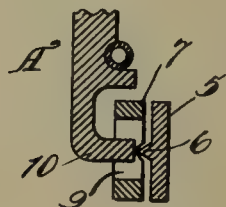
Fig. 6.



WITNESSES

A. E. Maynard.
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Fig. 7.



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APPLICATION FILED JULY 15, 1907.

4 SHEETS—SHEET 2.

Fig. 8.

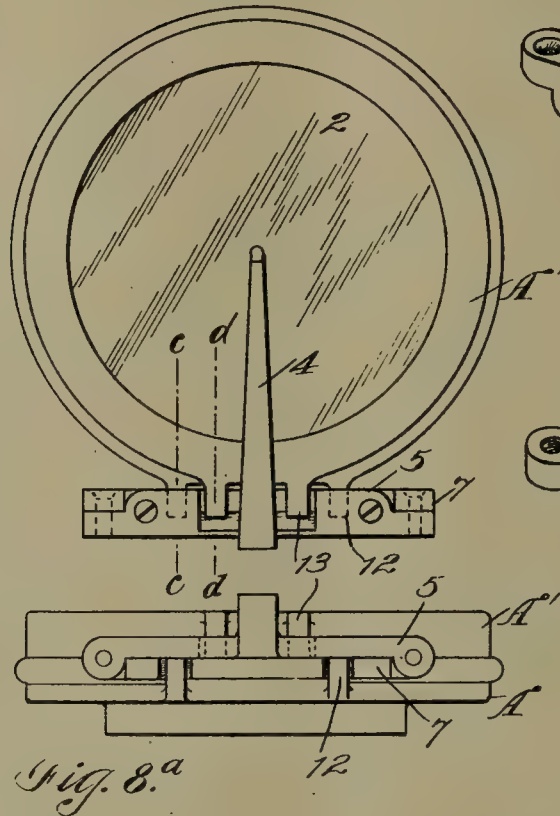


Fig. 10.

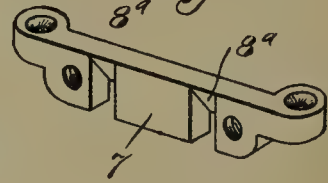


Fig. 10.a

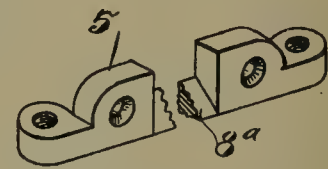


Fig. 9.

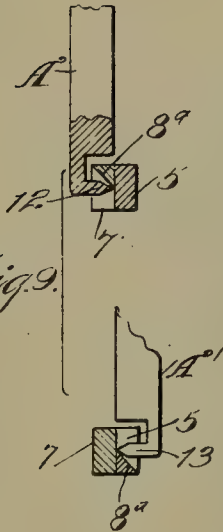


Fig. 15.

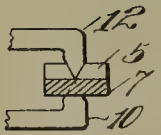


Fig. 8.a

Fig. 12.

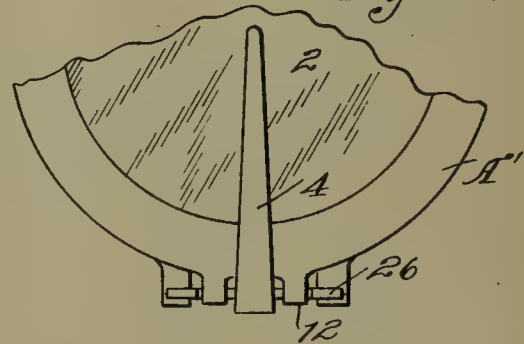


Fig. 11.

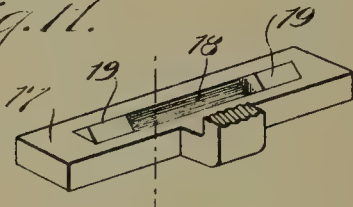


Fig. 11.a



WITNESSES

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Fig. 14.



Fig. 13.

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André Junod;
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ATTORNEY

No. 894,956.

PATENTED AUG. 4, 1908.

A. JUNOD.
SOUND REPRODUCER AND RECORDER.

APPLICATION FILED JULY 15, 1907.

4 SHEETS—SHEET 3.

Fig. 16.

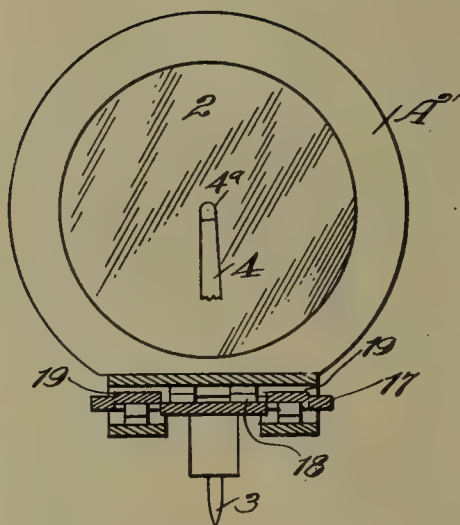
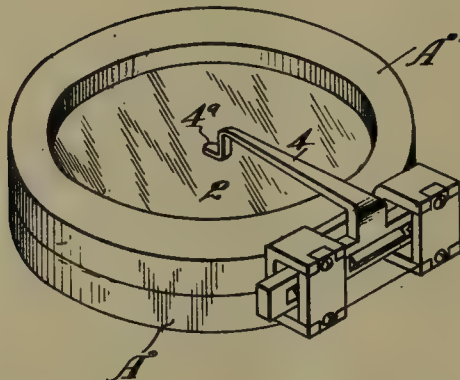


Fig. 17.

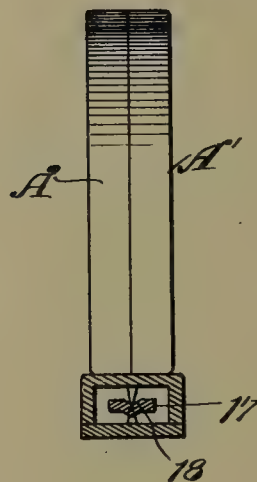


Fig. 18.

WITNESSES

Frederick E. Maynard
J. H. Hoose

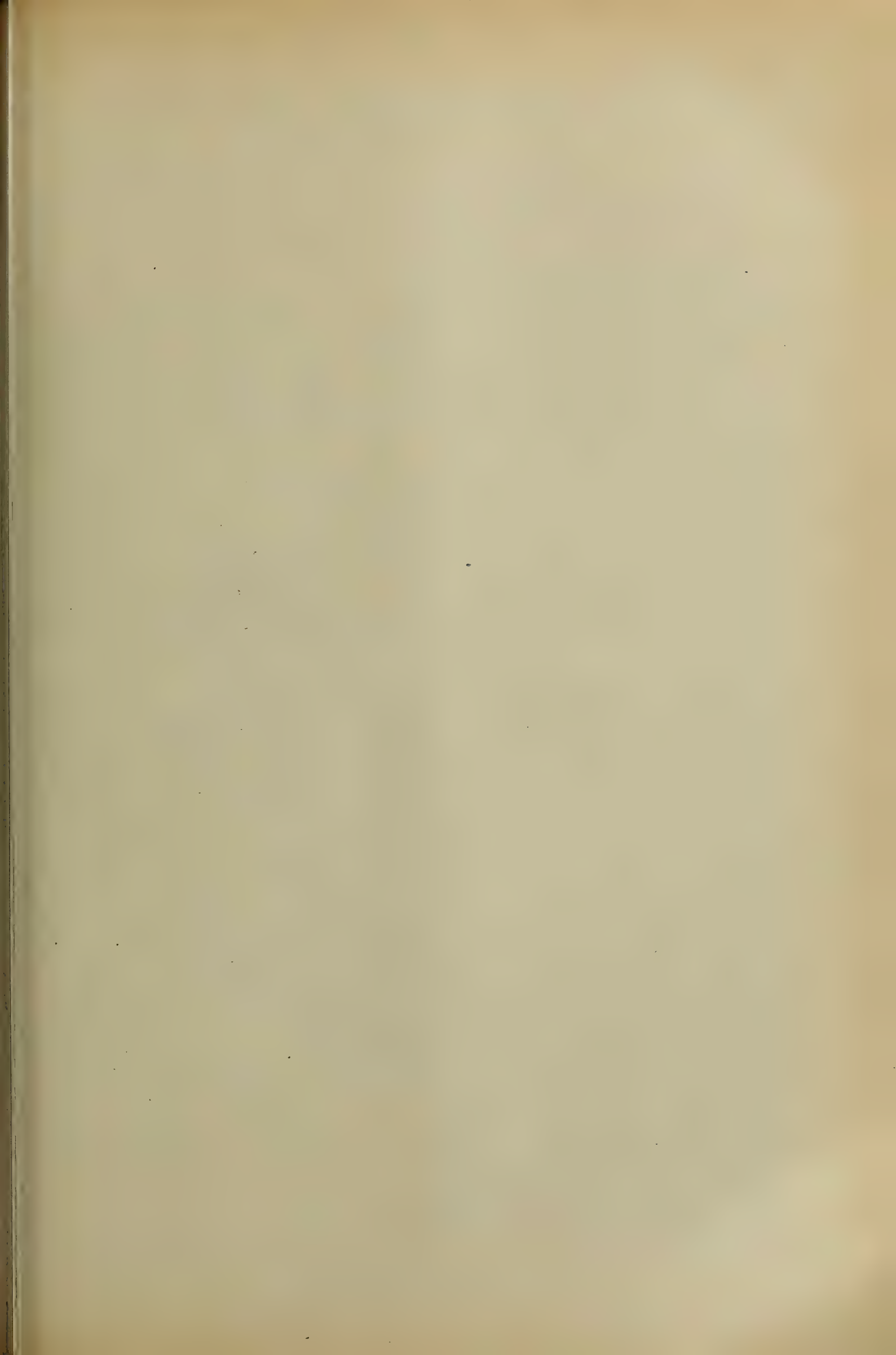
INVENTOR:

Andre' Junod;

BY

Geo. B. Strong

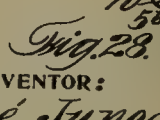
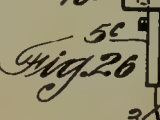
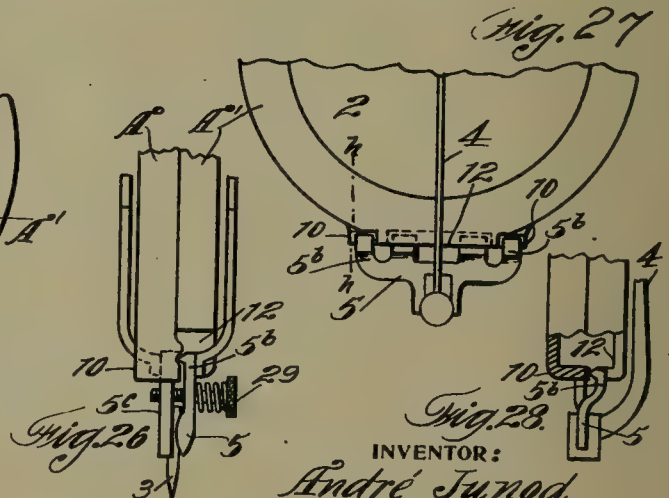
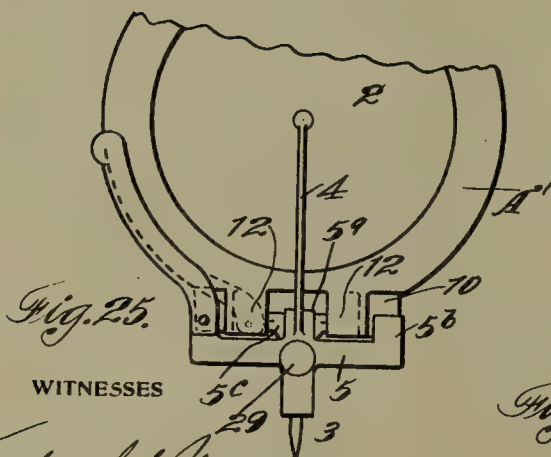
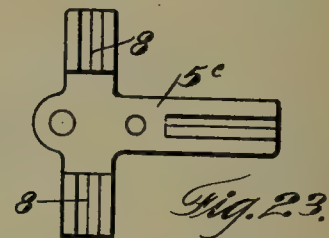
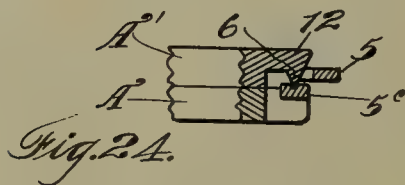
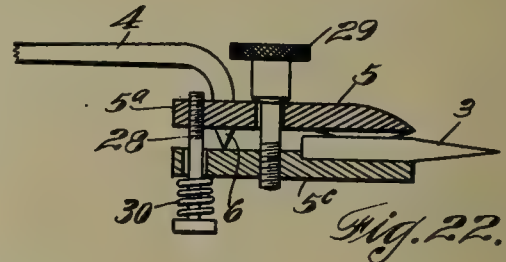
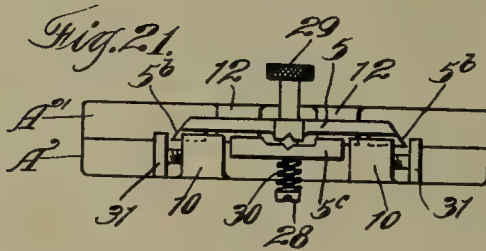
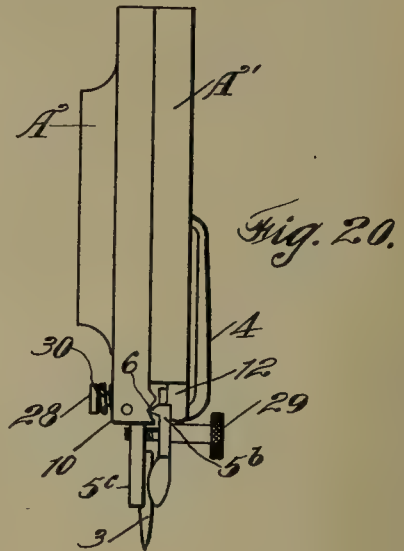
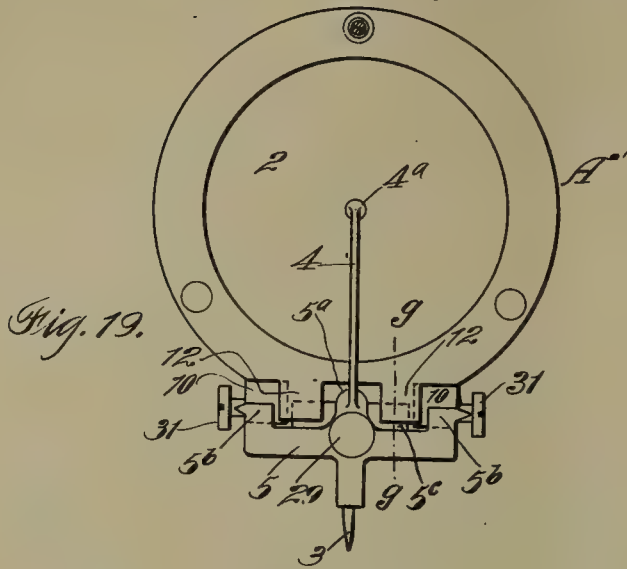
ATTORNEY



SOUND REPRODUCER AND RECORDER.

APPLICATION FILED JULY 15, 1907.

4 SHEETS—SHEET 4.



WITNESSES

Frederick C. Chagnard.
J. H. Mose

INVENTOR:

André Junod
BY
Geo. B. Strong

ATTORNEY

UNITED STATES PATENT OFFICE.

ANDRÉ JUNOD, OF FRUITVALE, CALIFORNIA.

SOUND REPRODUCER AND RECORDER.

No. 894,956.

Specification of Letters Patent.

Patented Aug. 4, 1908.

Application filed July 15, 1907. Serial No. 383,734.

To all whom it may concern:

Be it known that I, ANDRÉ JUNOD, a citizen of Switzerland, residing at Fruitvale, in the county of Alameda and State of California, have invented new and useful Improvements in Sound Reproduc-
ers and Recorders, of which the following is a specification.

My invention relates to a sound-reproducing apparatus, and is especially designed to be employed in connection with the stylus-bar of the gramophone, or kindred instrument, for producing an oscillating anti-friction bearing for said bar, and in which other undesirable movements are entirely obliterated.

My invention consists of the parts and the constructions and arrangements of parts which will be hereinafter described and pointed out in the claims.

Figure 1 is a sectional view on line A—A of Fig. 2, which is a plan view of the apparatus. Figs. 3 and 5 are perspective views of the members of the stylus-bar. Fig. 4 is a side view. Fig. 6 shows the hook attachment. Fig. 7 is a section on line B—B of Fig. 2. Figs. 8—8^a are plan and side view of a modified form. Fig. 9 shows sections on lines C—C and D—D Fig. 8. Figs. 10—10^a are detail views. Figs. 11—11^a show another form; as also do Figs. 12—13—14 and 15. Figs. 16—17—18 show the knife edged bearings in a plane parallel with the stylus-bar. Figs. 19—20—21 are a plan and two edge views of the bearing and the stylus point clamp. Figs. 22 to 28, inclusive, are sections and details of the same.

It is the object of my invention to provide an oscillating anti-frictional bearing for the stylus-bar of a gramophone, or like instrument, said bearing being so contrived as to allow an absolutely free movement of the stylus-bar in unison with the movements of the diaphragm, to which it is attached, and to prevent as far as possible any of the disagreeable rattling and vibratory noises caused by a loose action in such instruments; but it will be manifest that my device may be also employed in any connection where a perfect vibratory or oscillating action is required, with the least possible friction.

As shown in the present invention A and A' are two rings between which the vibratory diaphragm 2 is suitably clamped. The stylus 3 which follows the lines of the record-plate is fixed in one end of the stylus-bar 4,

either by a locking screw or by devices to be hereafter described, and the other end of the bar is fixed to the center of the diaphragm 2, as shown at 4^a, so that it transmits all of the vibrations and movements caused by the stylus on the record, through the diaphragm and the transmitter in the usual manner.

The stylus-bar 4 is bent into a form plainly shown in Fig. 3, and is fixed to a transverse bar 5, along the central line of the face of which is formed a V-shaped ridge 6. 7 is another bar parallel with and opposed to the bar 5, and this bar 7 may have formed longitudinally within it, a groove 8 of sufficiently wider angle than the V-shaped wedge of the bar 5, so that the latter may rest in the bottom of the V-shaped groove or channel 8 and have sufficient space on either side to allow it to tilt upon this knife edge without other movement. The bars 5 and 7 may be secured together with the parts in the above position, as shown in Figs. 1, 2, 4 and 8, or separated as in Figs. 19 to 28. The plane of these meeting edges is parallel to the plane of the diaphragm 2, and to the plane of separation of the rings A and A'. The groove or channel may be omitted from the bar 7 if desired, and the knife edge of 5 rest upon a plane surface of the part 7.

Holes are made through the bar 7, as shown at 9, and these holes register with arms 10 which project from one of the plates, as A, and may be bent at right angles so as to enter the holes 9 and present flat surfaces against which the V-shaped edges 6 contact. Knife edges are formed on projections or arms 12, plainly shown in Fig. 2, these arms projecting from the periphery of the ring A', and in the opposite direction from the arms 10. These arms enter holes 14 which are made in the bar 5. These knife edges and bearing surfaces being thus opposed to each other, it will be seen that there will be one set of bearings formed by the arms 12, entering the holes 14, and resting in the V-shaped groove 8; and the other arms 10 in like manner enter the opposed opening 9 in the bar 7, and rest upon knife edges 6.

The transverse bars 5 and 7, being bolted or otherwise secured together, as more plainly shown in Fig. 4, and carrying the stylus-bar, it will be seen that the tilting movement of the latter takes place upon these knife edges, and that the opposing contacts are of such a nature as to substantially eliminate any

other movements, and the vibration transmitted from the stylus to the diaphragm, produces a soft and pleasant tone.

Pivoted between the plates 5 and 7 is an arm 15 having at its outer end an inwardly turned point 16, and this point may be turned either into or out of contact with the periphery of the rings. When thrown into contact with the rings it increases the volume of the tone, and is very effective for instrumental or loud music. When thrown outwardly and away from the rings the tone is correspondingly softer, and fitted for vocal music.

In Figs. 8, 9 and 10 I have shown a device modified so that in place of the complete V-shaped groove, I have shown inclined surfaces 8^a which form practically opposing inclined sides, against one of which the V or wedge-shaped edge of 12 contacts, and against the other a correspondingly shaped edge of 13. The relative position of these inclines is well shown in the sectional views, Fig. 9, and the perspective views, Figs. 10 and 10^a; and it will be seen that when the bars 5 and 7 are bolted or secured together, as previously stated, these edges or inclines will be opposed so as to practically form opposite sides of V-shaped grooves upon the plane surfaces, at the bottom of which the wedges 12 and 13 rest.

In Figs. 11 and 11^a I have shown another means for accomplishing the same result. In this case the bar 17 is stamped out so that in the central portion is formed the V-shaped groove 18, and toward each end are formed the V-shaped wedges 19 having their convexities in opposite directions, as shown in the transverse section Fig. 11^a, in which the V-shaped wedge 20 is shown fitting the V-shaped groove 18.

Figs. 12—13—14 show another modified form in which the stylus-bar is provided with a transverse trunnion having central knife edge 25 and a pair of knife edges 26 at its ends resting in V-slots on the supporting arms 10^a.

It will be understood that in all the foregoing forms the general principle is preserved, of elongated, transverse, anti-frictional bearings and that such bearings may include either knife edges and corresponding grooves, or knife edges and plane opposing surfaces, the lines of contact being in any case in the plane of oscillation.

In Figs. 19 to 28, inclusive, the lugs 10 and 12 which are carried upon the rings A and A' are made enough wider than the lugs as shown in Figs. 1 to 18, so that the inner edges of one pair overlap the outer edges of the opposed pair, and the knife edges of one, and the opposed grooved surfaces of the other pair, have a very short bearing, and serve to bring the opposed rings and lugs to an exact register when they are put together.

The transverse bar 5 has three tongues, a central one 5^a, and two at the ends 5^b. The exterior tongues have knife edges which rest upon the bearing grooves or surfaces of the lugs 10, exterior to the lugs 12 of the other ring. The central tongue carries the stylus-bar 4 which is connected therewith.

5^c is a clamp, opposed to the bar 5, and held in contact with the knife edges of the lugs 12 by a thumb screw 28 connecting the clamp with the bar 5 upon one side of the knife edge bearing, and a second thumb screw 29 upon the other side of said bearing, as plainly shown in Fig. 22, so that when the screws are loosened, the clamp may tilt upon the knife edge and open to admit a point or stylus 3, and the screw 29 serves to clamp it when placed. The screw 28 is free within the hole in the inner end of the clamp, and a spring 30 surrounding the shank of the screw acts to open the clamp when the screw 29 is loosened. In order to limit and regulate side play of the stylus carrying parts, the ends of the tongues 5^b are made outwardly divergent, as shown in Figs. 19 and 21, and the heads of adjusting screws 31 are brought into as close contact with these points, as desirable to limit the side play.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. In a sound reproducing apparatus, the combination with the diaphragm, its supporting rings and stylus bar, of parallel connected bars transverse to the stylus bar, to one of which bars the stylus bar is attached, said bars having opposed knife edge and co-acting bearing surfaces, with their line of contact in the planes of the diaphragm, and said rings having members with opposed bearings disposed in line with the first named bearings.

2. In a sound reproducing apparatus, the combination with the diaphragm, its supporting rings and stylus bar, of parallel connected bars transverse to the stylus bar, to one of which bars the stylus bar is attached, said bars having co-acting knife edge and opposed bearing surfaces, arms projecting from the rings and having opposed bearings in line with the first named bearings.

3. In a sound reproducing apparatus, the combination with a diaphragm, its supporting rings and stylus bar, of parallel connected bars transverse to the stylus bar and provided with holes, and to one of which parallel bars the stylus bar is fixed, said bars having knife edge and opposed bearing surfaces respectively, arms projecting from the rings and bent to pass through the holes in the parallel connected bars, said bent arms having knife edge and opposed bearing surfaces in line with the bearings of the bars.

4. In a sound reproducing apparatus, the combination with the diaphragm, its sup-

porting rings, stylus bar, parallel connected bearing bars at right angles to the stylus bar, and arms projecting from the rings, having opposed bearings in line with those of the bars, of a pivoted arm having an inwardly turned point adapted to contact with the rings, or be moved out of contact therewith.

5 5. In a sound reproducing apparatus, a diaphragm, supporting rings with projecting lugs bent to form opposing knife edge and co-
10 acting grooved contacts connected bearing bars having openings, the inner edges of one pair of contacts overlapping the outer edges of the opposed pair to automatically register
15 the connected bars.

20 6. In a sound reproducing apparatus, a diaphragm, parallel connected bars having knife edge bearings, opposed clamping rings, a stylus bar connected with the diaphragm, and turnable upon said knife edge bearings, lugs projecting from the rings, and having

opposing groove and knife edge bearings registering with those of the stylus bar.

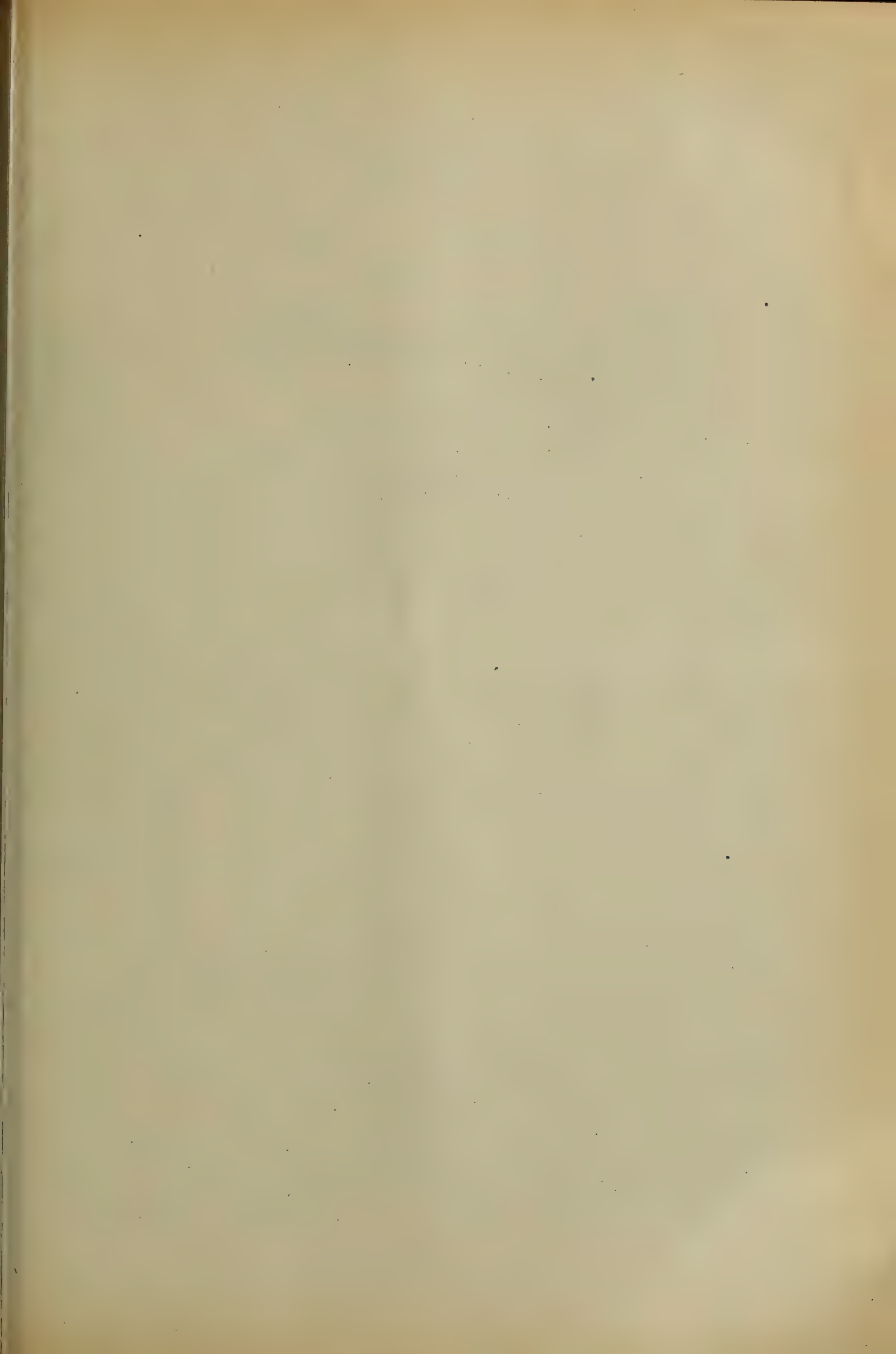
7. In a sound-reproducer, the combination with the diaphragm and its holder, of a stylus-bar, a bar upon which the stylus-bar is carried, extending transversely to the stylus-bar, said bar having a raised knife edge extending lengthwise, a second bar having a corresponding bearing surface upon which
25 the knife edge rests, arms projecting from the diaphragm holding rings, overlapping and forming contacts upon the transverse line of the knife edges.
30

In testimony whereof I have hereunto set
35 my hand in presence of two subscribing witnesses.

ANDRÉ JUNOD.

Witnesses:

S. H. NOURSE,
FREDERICK E. MAYNARD.



M. SAMUEL.
TALKING MACHINE.

APPLICATION FILED JUNE 8, 1907.

Fig. 1.

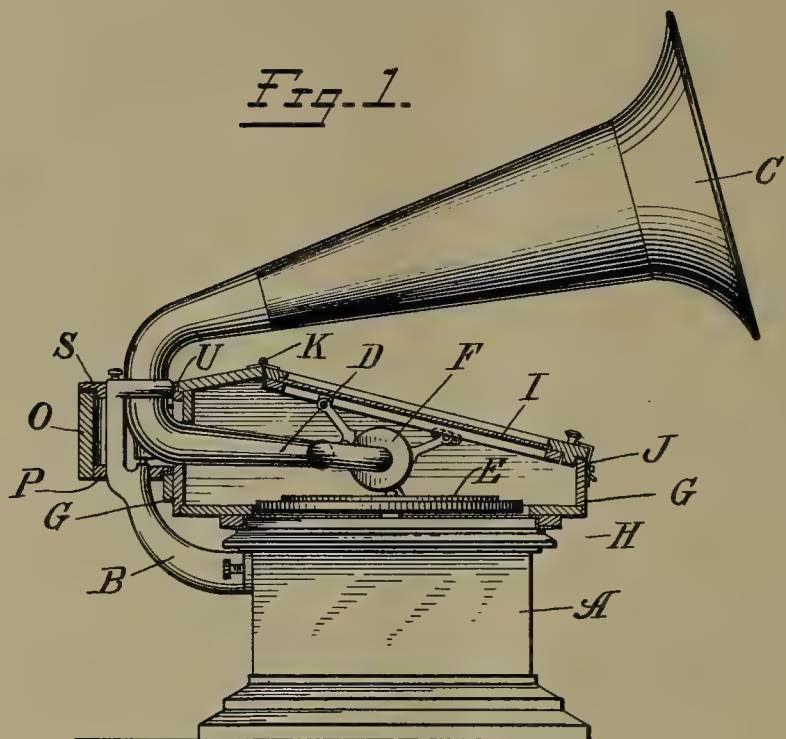


Fig. 2.

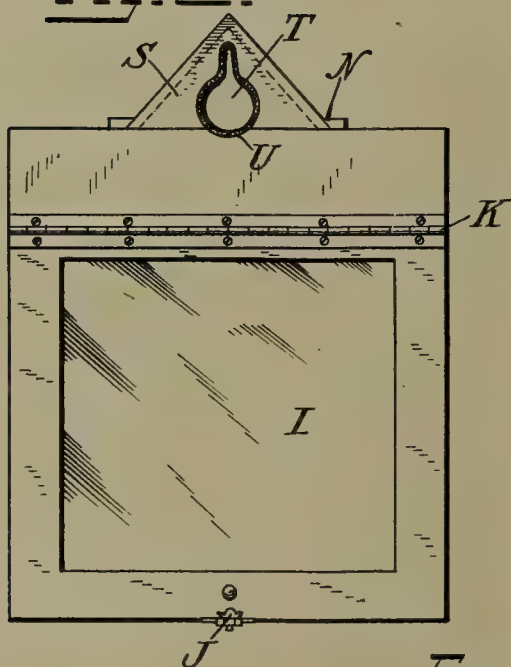


Fig. 3.

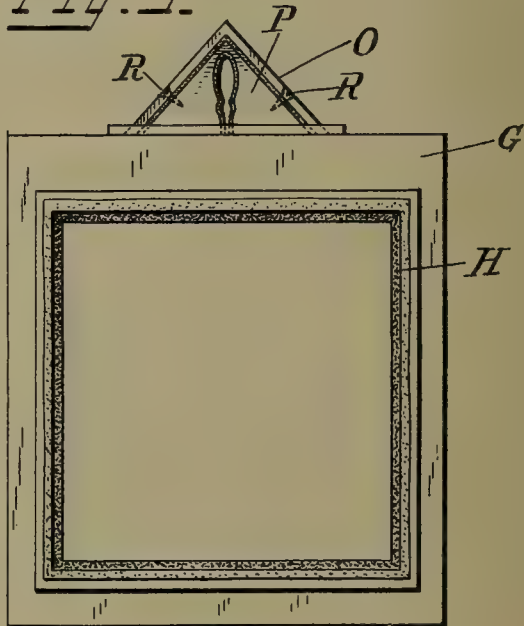
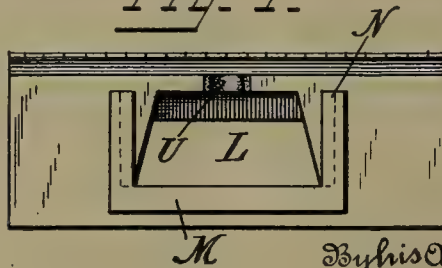


Fig. 4.



Witnesses:
G. V. Rasmussen
John A. Kehlbeck.

Inventor
Montagu Samuel
By his Attorneys
Briesen Thwait

UNITED STATES PATENT OFFICE.

MONTAGU SAMUEL, OF NEW YORK, N. Y.

TALKING-MACHINE.

No. 895,046.

Specification of Letters Patent.

Patented Aug. 4, 1908.

Application filed June 8, 1907. Serial No. 377,899.

To all whom it may concern:

Be it known that I, MONTAGU SAMUEL, a subject of the King of Great Britain, residing at New York, county and State of New York, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

The object of this invention is, to provide improved means whereby the delicate mechanism of sound production, particularly in disk record machines, is protected and in which this protection shall serve to deaden or destroy the sound produced by physical contact between the disk and stylus.

A specific embodiment of my invention is shown in the accompanying drawings, in which

Figure 1 shows a side-view of a talking machine provided with my improved cover, the latter being shown in section, Fig. 2 is a top-view of the device when removed from the talking machine, Fig. 3 is a bottom-view thereof, and Fig. 4 a rear-view from which the attachments adapted to inclose the horn support are omitted.

Referring to the drawings, A is the talking machine body containing the usual operating mechanism to rotate the disk.

B is the fixed bracket supporting the swinging horn C and also the swinging sound-conveyer D.

E is the disk, F the stylus-carrying reproducer.

G is a substantially square box adapted to fit snugly on top of the talking machine A, having felt-contacts H. The top of this box G is provided with a swinging glass-cover I, hinged at K and provided with a locking device J. The rear of the box G is apertured at L to allow for the full swing of the sound-conveyer D. Permanently attached to the rear of the box G is the bracket or support M the two side arms of which are grooved at N for the reception of the removable wall angle O. The apertured triangle P fits into the bottom of the chamber produced by sliding the wall angle O into the grooves N. The aperture in the bottom-piece P is felt-lined and so shaped as to snugly fit the shape of the bracket B at this point. Screws R securely connect the parts P and O. An apertured top-piece S rabbeted and felt-lined at the point of contact closes the top of this rear-extension from the main box G. This top-piece S is provided with an aperture T open at the front-end, and so shaped as to snugly fit around

the upper part of the bracket B. The main box or cover G extends rearwardly of the talking machine to a distance slightly beyond the furthest front-extension of the bracket B and the box G therefore is provided with the felt-lined circular cut U adapted to encircle the remainder of that portion of the bracket B which is not encircled by the face of the opening T.

In order to apply my talking machine cover to a machine of the character illustrated, I first remove the parts O, P and S, constituting the rear-extension of the main cover G. I then place the cover G upon the talking machine, inserting the sound-conveyer D through the rear-aperture L. I then slide the wall angle O into the grooves N and insert the bottom-piece P therein and fasten the same by means of the screws R. The top-piece S is then placed upon the walls O and the device is in condition for practical and efficient use.

The advantages of my invention are, first, the efficient exclusion of dust from the sound-producing parts of the machine. The operation can be watched through the glass-cover I; by swinging this cover on the hinge K, access is had to the record to change it when desired. This cover can be locked when the machine is not to be used. The various contacts between the attachment and the usual talking-machine parts being felt-lined, rattling is prevented and dust as well as other foreign particles are more completely excluded.

In the drawings I have shown my invention as applied to a well known existing form of talking machine, but I do not wish to be understood as claiming the invention only when applied to that form. By making the necessary mechanical changes the main idea can be readily adapted to many other forms of talking machines.

What I claim and desire to secure by Letters Patent is:

1. A talking machine provided with a body, a bracket projected therefrom, a sound-box and sound-conveyer supported on said bracket, and a box for inclosing the connected portions of the sound-conveyer and bracket, said box comprising a bottom wall having an aperture for the passage of the bracket, a top wall having an aperture to fit the upper end of the bracket and side walls disposed obliquely with reference to the body.

2. A talking machine provided with a
body, a bracket projected therefrom, a
sound-box and sound-conveyer supported
by said bracket, a protective casing set on
5 top of the body and inclosing the sound-box
and part of the sound-conveyer, a support
secured to said casing adjacent to the point
where the sound-conveyer passes through
it, a box comprising side walls arranged ob-
10 liquely with reference to the casing and having
a sliding connection with said support, and
top and bottom walls apertured for the re-
ception of said bracket.

3. A talking machine provided with a

body, a bracket projected therefrom, a 15
sound-box and sound-conveyer supported
on said bracket, and a box for inclosing the
connected portions of the sound-conveyer
and bracket, said box being apertured at the
bottom for the passage of said bracket, and 20
at the top for the egress of sound.

In testimony whereof I have hereunto set
my hand in the presence of two subscribing
witnesses this 6th day of June, 1907.

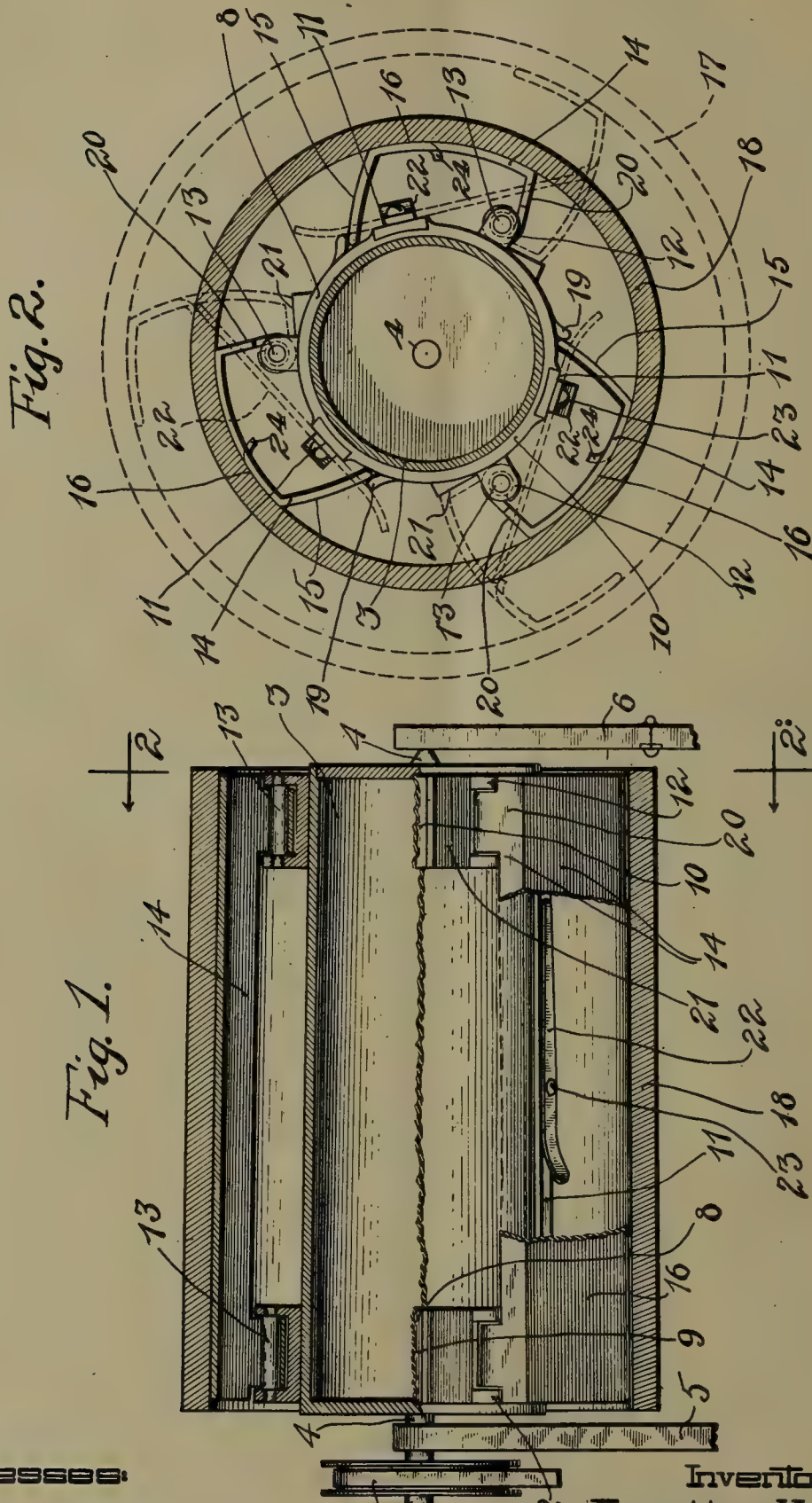
MONTAGU SAMUEL.

Witnesses:

EUGENE EBLE,

JOHN A. KEHLENBECK.

F. HARDINGE.
ATTACHMENT FOR PHONOGRAPHIC MACHINES.
APPLICATION FILED DEC. 30, 1905.



Witnesses:

Arthur H. Boettcher.
Georg C. Figham.

Inventor

Franklin Hardinge

By Charles A. Brown
Attorney.

UNITED STATES PATENT OFFICE.

FRANKLIN HARDINGE, OF CHICAGO, ILLINOIS.

ATTACHMENT FOR PHONOGRAPHIC MACHINES.

No. 895,456.

Specification of Letters Patent.

Patented Aug. 11, 1908.

Application filed December 30, 1905. Serial No. 294,029.

To all whom it may concern:

Be it known that I, FRANKLIN HARDINGE, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Attachments for Phonographic Machines, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to phonographic machines, more particularly to that class of phonographic machines in which the sound waves are recorded upon wax or composition fashioned into a cylindrical or slightly conical shape.

As is well known to those familiar with the art, the majority of phonographic machines are constructed to accommodate what is known as the standard record. Other machines are constructed which accommodate what is known as the intermediate record, a record of larger diameter; and there are also machines manufactured which accommodate what is known as concert records, a record of still larger diameter. It is well known that phonographic machines at the present time, are constructed to accommodate but one of these sizes, and it is the object of my invention to provide improved means whereby any of these three records of different sizes may be accommodated, in a single machine.

My invention will be more readily understood by reference to the accompanying drawings, in which,

Figure 1 is an elevation view of my invention, parts being broken away to more clearly illustrate the same, Fig. 2 is a section taken on line 2—2 of Fig. 1.

I have shown a rotatable carrier, 3, adapted to carry the standard size record, mounted upon the axial shaft, 4, which is journaled in the stationary bearing, 5, and the removable bearing 6. The shaft, 4, is adapted to be rotated by any suitable means as is usual in phonographic machines of this class and may be accomplished, for instance, by a pulley arrangement, 7, as shown in the drawing. The machine being of standard size, it follows that the standard size record may be accommodated.

The invention herein consists of an improved device which may be applied directly to the carrier 3, which is slightly tapered,

so that when a standard record or the attachment is applied thereto a snug fit will be assured. The supporting frame, 8, is composed of the end rings, 9 and 10, which are bored to fit the carrier, 3, and the connecting bars 11, 11 which connect together the rings, 9 and 10, and which, as shown, do not engage the carrier, 3. It is apparent that with the parts arranged in this manner, a secure temporary connection may be obtained between the carrier and the attachment. Cast integrally with each of the rings, 9 and 10, are the bearings, 12, 12; in which are mounted the shafts, 13, 13. Upon these shafts, 13, are pivotally mounted the supports, 14, 14, these supports being provided with two distinct engaging surfaces, 15, and 16, for engagement with the concert and intermediate records, 17 and 18, respectively. As shown in the drawings the shaft, 13, is so journaled in the bearings that it is parallel to the surface of the carrier, 3. This construction is desirable so that when the supports, 14, are mounted upon the shafts, 13, the precise taper, as in the carrier, may be maintained in the surfaces, 15 and 16, which is essential for the proper reception of the intermediate and concert records. For convenience I will call the position of the supports when adapted for the reception of an intermediate record the normal position. This position is shown in full lines in the drawing, Fig. 2. As shown in the drawings, I prefer that the surface, 16, of the supports 14, should be an arc of a circle of the same diameter as the inside diameter of the intermediate record, and the surface, 15, should be an arc of a circle of the same diameter as the inside diameter of a concert record.

When in the normal condition the supports, 14, are held firmly by their own tension against the studs, 19, 19, on the rings, 9 and 10, and as shown in the drawing, the surface of the stud is rounded, and the end of the support is rounded, so that it may easily be snapped into place and brought into tension and may thereby be securely held in place. It is thus apparent that with the attachment in this normal condition an intermediate record may be accommodated.

When it is desired to accommodate a concert record, the supports, 14, are thrown out of engagement with the studs, 19, and swung about the pivot, 13, until the surfaces 20, 20, are brought into engagement with the seats

21, 21, upon the rings 9 and 10. These seats, 21, are so disposed that when the surfaces, 20, are brought into engagement with them the surfaces, 15, of the supports, 14, will be coincident with the inner circumference of the concert record. In order to securely hold the supports in this position, which may, for convenience, be called the abnormal position, I provide the braces 22, 22, pivoted by means of the screws, 23, 23, upon the connecting bars or straps, 11, 11, said braces being so disposed, that by turning them about their pivots they may be brought into engagement with the studs, 24, 24, on the supports, 14, thereby holding the supports, 14, firmly against their respective seats, and in position for the reception of a concert record. This condition is shown in dotted lines in Fig. 2. It is thus made apparent that by means of my invention a concert record may also be accommodated.

It is evident from the foregoing description, that the device can very easily be made; the construction being such that it is convenient to cast the stationary framework and to stamp the adjustable supports from the sheet metal.

It is evident that changes and modifications may be made in the device herein described by those skilled in the art, without departing from the spirit or scope of my invention, so I do not, therefore, wish to be limited to the precise construction herein shown.

I claim as new and desire to secure by Letters Patent:

1. In an attachment for phonographic machines, a frame work conforming to the rotatable carrier of a phonographic machine, supports having a series of engaging surfaces and capable of adjustment into different positions mounted upon said frame work, the supports being so disposed that they may carry a phonographic record in each of said positions.

2. In an attachment for phonographic machines, a frame work adapted to fit the rotatable carrier of a phonographic machine, supports having a series of engaging surfaces and capable of adjustment into different positions mounted upon said frame work, and means whereby said supports may be firmly held in said positions, said supports being so disposed that they may carry a phonographic record in each of said positions.

3. In an attachment for phonographic machines, a frame work adapted to fit the rotatable carrier, of a phonographic machine, bearings cast integrally with said frame work, and supports having a number of engaging surfaces and capable of adjustment into different positions mounted upon shafts journaled in said bearings, said supports being so disposed that they may carry a phonographic record in each of said positions.

4. In an attachment for phonographic machines, a frame work adapted to fit the rotatable carrier of a phonographic machine, bearings cast integrally with the frame work, supports capable of adjustment into different positions mounted upon shafts journaled in said bearings, said supports having engaging surfaces when adjusted into any one of the different positions and means whereby said supports may be held firmly in the different positions, said supports forming in each of said positions a carrier for a phonographic record.

5. In an attachment for phonographic machines, a frame work adapted to fit the rotatable carrier of a standard machine, supports capable of adjustment into different positions mounted upon said frame work, said supports having a series of engaging surfaces and means whereby said supports are firmly held in each position, said supports forming in one position a support for a record of certain size and when in another position forming a support for a record of larger size.

6. In an attachment for phonographic machines, a frame work adapted to fit snugly the rotatable carrier of a standard machine, bearings cast integrally with said framework, supports mounted upon shafts journaled in said bearings, said supports being provided with a plurality of engaging surfaces and capable of adjustment into different positions, and means for holding said supports in said positions, said supports forming when held in one position a carrier for a phonographic record of certain size, and when held in another position a carrier for a phonographic record of another size.

7. As an article of manufacture, a record holder for a phonographic machine equipped with a plurality of arched arms adapted to hold various sized records.

8. As an article of manufacture, a record holder for a phonographic machine equipped with sets of arched arms adapted for holding different sized cylindrical records.

9. As an article of manufacture, a cylindrical supporting frame adapted to slip over the cylindrical carrier frame of a phonographic machine, and on said supporting frame pivoted members having arched surfaces for adapting said frame to receive different sized cylindrical phonographic records of greater diameter than the normal record for the phonographic machine.

10. As an article of manufacture, a skeleton carrier frame substantially cylindrical and pivoted arch members adapted in a normal position to receive a cylindrical phonographic record of one size, said carrier frame being adapted to be expanded to receive and support a record of greater size.

11. As an article of manufacture, a supporting frame for a cylindrical phonographic record, mechanism comprising a series of

arched members on said frame adapted in a normal position to offer seating surfaces for a record of one size, said mechanism being adapted to be moved to a position to offer
5 seating surfaces for records of greater size.

12. As an article of manufacture, a skeleton supporting frame adapted to slip over and engage the normal rotatable carrier of a phonographic machine, mechanism comprising
10 a plurality of arched arms on said frame adapted to assume a normal and alternate position, said mechanism when in its normal position offering seating surfaces for receiving and supporting intermediate sized records
15 and when in its alternate position offering seating surfaces for receiving and supporting large cylindrical records.

13. As an article of manufacture, a skeleton frame for separable attachment to a phonographic machine, arched wings pivoted
20 to said skeleton frame, said wings in their normal position offering seating surfaces for receiving cylindrical phonographic records of one size, said wings being adapted to assume
25 an alternate expanded position and in such position to offer seating surfaces for receiving cylindrical records of larger size.

14. As an article of manufacture, a skeleton frame for separable attachment to a
30 phonographic machine, arched wings pivoted to said skeleton frame, said wings in their normal position offering seating surfaces for receiving cylindrical phonographic records of one size, said wings being adapted to assume
35 an alternate expanded position and in such position to offer seating surfaces for receiving cylindrical records of larger size, said wings

being adapted to be locked when in their normal and alternate positions.

15. As an article of manufacture, a skeleton supporting frame adapted for separable
40 attachment with a phonographic machine, arched wings on said frame adapted to assume normal and alternate positions, said wings when in their normal position offering
45 conical seating surfaces for receiving the tapered interior surfaces of cylindrical phonographic records of one size, said wings when in their alternate position offering seating
50 surfaces for engaging the tapered interior surface of records of greater size.

16. As an article of manufacture, a skeleton supporting frame having tapered engaging
55 surfaces having frictional engagement with the tapered surface of a tapered rotatable carrier of a phonographic machine, arched wings extending from said supporting
60 frame adapted to assume a normal and an expanded position, said wings when in their normal position offering tapered surfaces for
65 engaging the interior tapering surface of cylindrical records having greater diameter than the normal records for the machine, and when in an expanded position offering tapered
seating surfaces for engaging the tapered interior surface of still greater cylindrical records.

In witness whereof, I hereunto subscribe my name this 21st day of December A. D., 1905.

FRANKLIN HARDINGE.

Witnesses:

CHARLES J. SCHMIDT,
LEONARD W. NOVANDER.



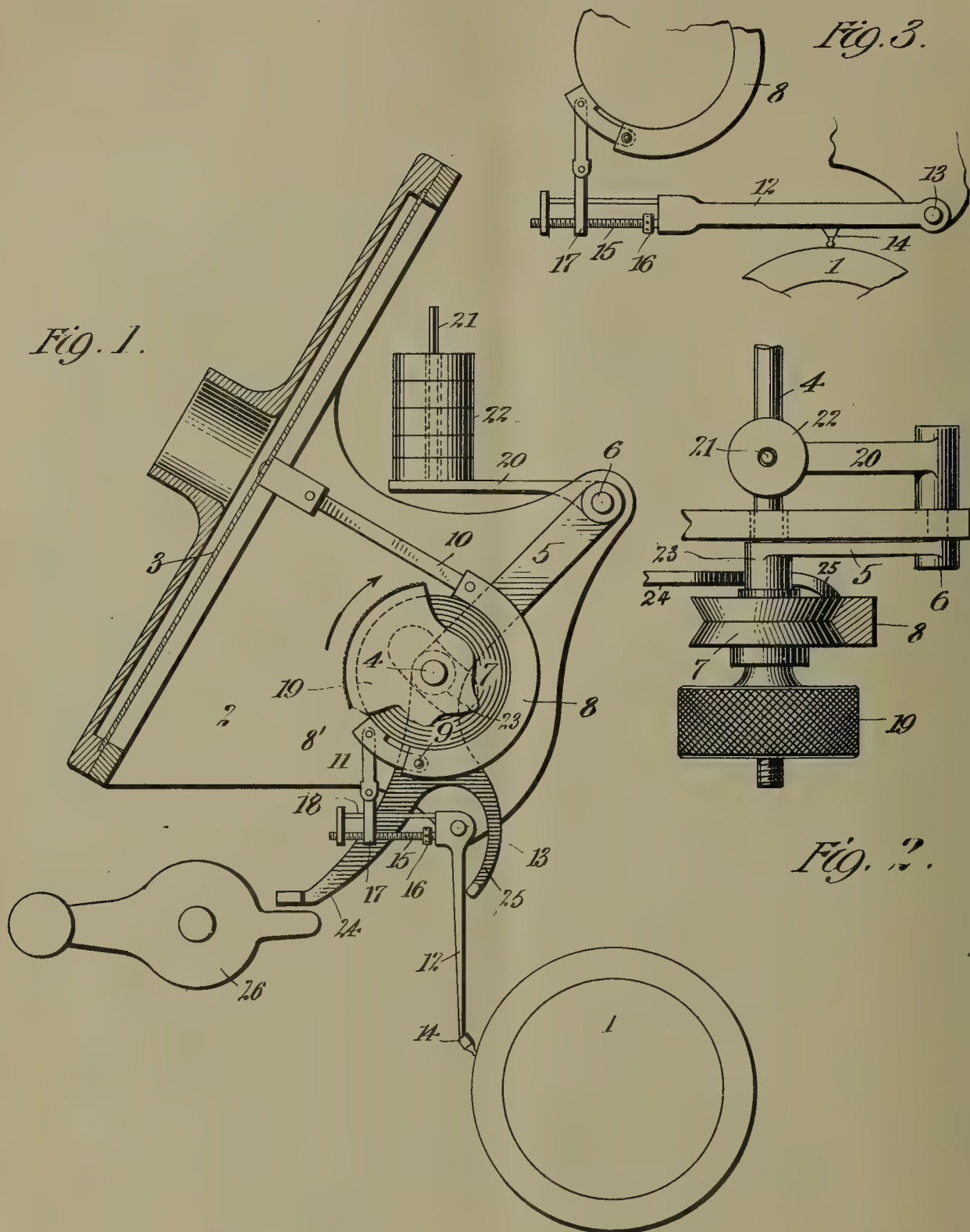
No. 895,853.

PATENTED AUG. 11, 1908.

J. H. J. HAINES.

SOUND AMPLIFIER FOR PHONOGRAPHS AND TALKING MACHINES.

APPLICATION FILED APR. 25, 1908.



Witnesses:
Charles Ober,
Waldo M. Chapman

John H. J. Haines, Inventor
By his Attorneys
Raubach & Stockbridge

UNITED STATES PATENT OFFICE.

JOHN H. J. HAINES, OF NEW YORK, N. Y.

SOUND-AMPLIFIER FOR PHONOGRAPHS AND TALKING-MACHINES.

No. 895,853.

Specification of Letters Patent.

Patented Aug. 11, 1908.

Application filed April 25, 1908. Serial No. 429,122.

To all whom it may concern:

Be it known that I, JOHN H. J. HAINES, a citizen of the United States, residing at the city of New York, in the borough of Manhattan and State of New York, have invented certain new and useful Improvements in Sound-Amplifiers for Phonographs and Talking-Machines, of which the following is a full, clear, and exact description.

10 This invention relates to talking machines, and has special reference to a type of device for amplifying the reproduction of sound from a record cylinder or plate, comprising a friction roll and shoe introduced between the
15 stylus bar and the diaphragm, whereby the vibrations of the stylus are reproduced in the diaphragm in an amplified degree.

The object of my invention is to provide a construction of amplifier which will increase
20 the loudness of the reproduction very considerably without loss of definition or articulation.

A further object of the invention is to provide means whereby the degree of loudness of
25 the reproduction can be varied at will and by simple mechanism and manipulation.

In carrying out my invention I utilize a form of shoe on the friction roll, which encompasses more than one-half of the circumference thereof, and I connect one end of
30 this shoe with the stylus lever in such a way that the outward thrusts of the stylus created by the vertical undulations in the record groove, drive the shoe into intimate
35 contact with the roll, while the friction roll and shoe are caused to bodily follow the stylus in its inward strokes, permitted by the depressions in the record groove. The undulations in the record groove are made up of
40 crests and depressions of varying depth and shape, and I have found that by so organizing my lever system that the crests of the record groove will act directly to increase the friction of the shoe, the sharpest and clearest
45 reproduction is obtained. At the same time the arrangement must be such that when the stylus enters a depression in the groove, the friction shoe and roll will follow it, so that the shoe will receive the full effect of the thrust caused by the next succeeding crest. This following-up action of the roll and shoe therefore increases the loudness, but it also retains the purity or definition because it
50 overcomes any tendency of the shoe to rattle or loosen from the roll during the recessions or inward strokes of the stylus.

My friction roll is carried at the end of a swinging shaft as usual, and its weight is supplemented by a weighted nut applied to the end of the shaft in the usual manner, the
30 total weight at the end of the shaft being predetermined in proportion to the coefficient of friction between the roll and shoe, so that when the machine is in operation, the vibratory system will be floating in stable
35 equilibrium at a certain elevation or distance from the record tablet where the stylus will be in operative relation to the record, and the vibrations due to the rubbing of the shoe upon the roll will be at a certain constant
70 rate suitable to cooperate with and augment the vibrations which are to be superposed thereon by the reproducing stylus. Under this floating condition, there will be no effective force applied to the stylus to compel it to
75 follow the undulations of the record groove, and I therefore add to the vibratory system a supplemental weight or spring so applied as to create a tendency of the roll and shoe to press the stylus against the record surface,
80 thus compelling the stylus to follow the undulations of the record groove and to react upon the friction shoe. This extra weight or spring, therefore, supplies the means for causing the friction roll and shoe to bodily
85 follow the movements of the stylus bar. But it must be and is so associated with the vibratory system that the vibrations of the stylus are not absorbed thereby, but on the contrary are devoted entirely to varying the
90 grip of the shoe upon the roll.

The invention will be more specifically described in connection with the accompanying drawing, in which:

Figure 1 is an end elevation of a portion of
95 a talking machine and my improved amplifying attachment, some parts being broken away. Fig. 2 is a plan of the mechanism at the end of the swinging shaft. Fig. 3 illustrates a modification of the stylus bar.

100 1 is a record tablet in the form of a cylinder.

2 is a frame carrying the speaker comprising essentially a diaphragm 3 and the amplifying devices interposed between the dia-
105 phragm and the record.

4 is a shaft commonly found in this type of machine, made in two sections connected by a universal joint, one section being driven by means of a belt or gearing from the motor
110 of the machine, and which is not illustrated herein, while the other section which is

shown, is adapted to swing freely at its outer end by reason of the universal joint referred to, but is supported in a crank-arm 5, pivoted at 6 in the frame. Near the extremity of shaft 4 and in the same plane with the center of the diaphragm 3 is mounted a wheel or roll 7 of amber or other similar material, preferably having a grooved periphery which is embraced by a shoe having an inner surface corresponding to the shape of the groove in the wheel and being of hard rubber or other similar material adapted to afford a certain amount of friction when the wheel and shoe move with respect to each other.

This shoe embraces more than one-half of the circumference of the roll and is preferably made in two sections 8 and 8' hinged together at 9. A friction device which thus embraces more than half of the circumference of the roll acts more like a strap than a shoe and affords more friction for a given amount of pressure than the shorter shoe. One end of the shoe is connected with the center of the diaphragm 3 by a link 10, while the other end is connected with the stylus bar by a link 11. The stylus bar is indicated by 12 and is pivoted at a fixed point 13 in the frame. The stylus 14 works in the record groove of the record cylinder 1. The stylus lever in Fig. 1 is in the form of a bell-crank, while in Fig. 3 it is straight. Both forms are provided with a threaded rod 15 having a finger-piece 16 by which it can be turned, the extremities of the rod being mounted in bearings, and there being a nut 17 working on the rod and itself held from rotation and guided by a second rod 18. The nut 17 has an extension to which is pivotally connected the end of link 11. It will be seen that by turning the threaded rod 15, the angular relation of the link 11 with respect to the shoe and the axis of the roll can be changed. Thus, by moving the nut 17 outward, the link more nearly approaches a radial line with respect to the shaft 4, and the thrusts of the stylus bar towards and away from the shoe will be more direct and effective, resulting in louder reproduction, whereas a movement of the nut 17 inward, will throw the link 11 into a position more remote from the radius of shaft 4, resulting in less effective movements of the stylus bar and correspondingly weaker reproduction.

The extremity of the shaft 4 is threaded to receive a weighted nut 19 such as is commonly used on this type of amplifier. The weight of this nut, together with that of the other elements at the end of shaft 4, tends to swing the shaft downward against the shoe. The pivot pin 6 to which the crank arm 5 is secured, also carries another arm 20 on the same side of the axis as the arm 5, and which is provided with a vertical pin 21 over which may be passed any required number of sections of a weight 22, which weight also serves

to throw the swinging shaft 4 downward. But it will be seen that this weight 22 presses upon shaft 4 through the bearing 23 and while the shaft is given a downward tendency, movements so rapid and short as sound vibrations are not transmitted from the shaft to the crank arm and weight 22. For convenience in raising the vibratory system to permit of the free movement of the carriage 2 to change the position of the speaker, the crank arm 5 is provided with extensions 24 and 25. The former is engaged by the press lever 26 and lifted, which throws the latter against the stylus bar and removes it from the surface of the cylinder.

The parts are shown in running or operating position in Fig. 1. When the machine is not running, the shaft 4 is in a slightly lower position than that shown, but, as soon as it commences to rotate in the direction of the arrow, the friction between the stationary shoe 8, 8' and the roll causes the end of the shaft 4 to rise, the upward movement ceasing when the friction between the shoe and roll has been reduced to the predetermined degree. This friction thereafter remains constant and represents a certain periodicity or rate of vibration of the roll, shoe and weight 19, which is communicated to the diaphragm through the link 10. So long as the speed of rotation and the weight, exclusive of the weight 22, remain constant, there will be no tendency of the shaft 4 to either rise or fall after it once assumes its operating position, but these parts will remain in a floating condition and under a constant rate of vibration. In this condition there is only a slight tendency of the stylus bar to press its point against the record, and such vibrations as would be imparted to the stylus bar by the undulations in the record groove would merely cause a chattering of the end of the shoe to which link 11 is connected, against the periphery of the roll, and the reproduction would be very much distorted. For this reason the weight 22 is added and made sufficient to impart a decided constant inward thrust to the point of the stylus directed from the shaft 4 through the roll, the shoe, the link 11, and the stylus bar. With this equipment it will be seen that the elevations or crests of the undulations in the record groove will move the stylus outward and throw the end of the shoe against the roll, while the roll, together with the shoe, will fall and follow the end of the stylus, into the depressions of the record groove. The result of this is that the most effective parts of the record groove, to wit, the crests, will be used to create the extra friction which is to be superposed upon the constant friction between the shoe and roll, and then communicated to the diaphragm, and that the shoe, instead of falling away from the roll when the stylus enters the depressions, thereby causing chattering,

will remain in more intimate contact with the roll, and there will be no lost motion between the shoe and the roll when the outward thrust of the stylus occurs. This action is analogous to that which takes place in a microphone, wherein there is no make and break of the circuit between the contacts, but only a variation of pressure; the result is also similar, for in a make and break telephone the speech is garbled by sputtering and is quite unintelligible, while, with variation of pressure only, the articulation is perfect. So in friction amplifiers, the chattering which occurs when the vibratory system does not follow the movements of the stylus, is responsible for foreign noises and imperfect reproduction, whereas, in my device, with the mere variation in pressure, the reproduction is perfectly clear. Therefore, clearness is obtained by the fact that the vibratory system follows the movements of the stylus, and loudness is obtained by the fact that the friction is produced by the most effective part of the undulations in the record groove.

In most forms of friction roll amplifiers used heretofore, there has been what is known as a "floating weight," being a weighted arm pivoted to some part of the frame and on which is pivoted the stylus bar. The function of this weight is to keep the point of the stylus bar in contact with the record surface, rising and falling to compensate for any eccentricities thereof. Such a weight necessarily partakes of and absorbs the vibrations of the stylus bar produced by the record groove, and therefore detracts from or lessens the amount of vibration that is delivered from the bar to the shoe. It has also been proposed to apply this extra weight to the end of the shaft which carries the friction roll, by making the weight which corresponds to 19 in the present case, proportionately heavier than is required to establish the constant friction or uniform rate of the shoe upon which the record vibrations are to be superposed. When the weight is thus located, the stylus bar is held against the surface of the record, but the operation is still defective because this added weight continues to absorb the vibrations of the stylus bar, making the latter do more work and consequently dampening the vibrations which are delivered to the diaphragm from the stylus bar. The problem therefore is to so apply this additional weight which keeps the stylus against the record surface, that the full effect of the vibrations of the stylus bar will be delivered, without dampening, to the friction shoe and diaphragm. This problem is solved by my invention wherein I apply the extra weight to the crank arm 5, or to some other element which bears downward upon shaft 4, and which is preferably stationary with respect to said shaft. To more fully explain this method of applying this

extra weight, it will be seen that shaft 4 rotates freely in the bearing 23, at the end of crank-arm 5, and consequently there is no molecular contact between the crank-arm and the shaft, but merely a loose, surface contact. Such a loose or imperfect contact between these two bodies acts as a bar against the transmission of high vibrations, so that when such vibrations occur in the shaft, they will not be transmitted to the crank-arm and weight. It follows from this that while the extra weight 22 will serve to hold the stylus bar against the record, it will not interfere with or dampen the high vibrations imparted to the stylus bar by the undulations of the record groove, and the full effect of the latter will be directed against the friction shoe, and thence transmitted to the diaphragm. In as much, however, as the end of shaft 4 with the weight 19, roll 7 and shoe 8, 8', are given a constant bias towards the record cylinder, by the extra weight 22, the said shaft 4 with all of its parts will bodily follow the point of the stylus into the depressions of the undulatory sound groove, the whole vibratory system, exclusive of the extra weight 22, thus partaking of the sound vibrations. This, as before pointed out, prevents the shoe 8' from breaking contact with the surface of the roll, when the stylus falls into the depressions of the record groove, permitting only the weakening of the pressure of the shoe at such times. The same action also makes the crests of the undulations of the groove more effective since the thrusts against the shoe caused thereby begin at once at the bases of the crests. My improvement therefore eliminates all lost motion between the stylus bar and the friction wheel, and avoids dampening of the record vibrations, thereby affording a pure and loud reproduction.

What I claim, is:—

1. In a talking machine, comprising a stylus and a vibratory system through which the vibrations of the stylus are transmitted, a weight adapted to cause the stylus to follow the undulations of the record groove in combination with a vibration barrier interposed between the weight and the vibratory system.

2. In a talking machine, the combination of a record tablet, a diaphragm, a reproducing stylus, an amplifying friction system interposed between the stylus and a weight for holding the stylus against the record surface of the tablet, and a vibration barrier interposed between the weight and the vibratory system.

3. In a talking machine, a reproducing amplifier comprising a swinging friction roll and shoe, a weight applied to the roll to give a predetermined constant rate of vibration to the shoe, a stylus bar, an extra weight for causing the stylus to follow the undulations of the record groove, and a vibration barrier

interposed between the extra weight and the vibratory system.

4. In a talking machine, an amplifying device comprising a swinging shaft carrying a friction roll and shoe, a diaphragm connected with one end of the shoe, and a stylus bar connected with the other end thereof, the latter connection being such that the outward thrusts of the stylus bar will increase the friction between the shoe and the roll, a weight applied to the shaft to create a constant friction between the roll and shoe, and means whereby the roll and shoe will follow up the movements of the stylus bar.

5. In a talking machine, an amplifying device comprising a swinging shaft carrying a friction roll and shoe, a diaphragm connected with one end of the shoe, and a stylus bar connected with the other end thereof, the latter connection being such that the outward thrusts of the stylus bar will increase the friction between the shoe and the roll, a weight applied to the shaft to create a constant friction between the roll and the shoe, and an extra weight or its equivalent adapted to cause the roll and shoe to follow up the movements of the stylus bar, without itself absorbing the vibrations of the stylus.

6. In a talking machine, the combination of a rotary swinging shaft carrying a friction roll, a friction shoe embracing more than half of the circumference of said roll, a diaphragm connected to one end of said shoe, a stylus bar connected to the other end of said shoe,

and adapted to increase the normal friction of the shoe upon the roll by the outward movements of the stylus, and means for causing the friction roll and shoe to follow the inward movements of the stylus.

7. In a talking machine, an amplifying device comprising a friction roll, a friction shoe bearing thereon, a diaphragm connected with one end of the shoe, a stylus bar, a link connected with the other end of the shoe and receiving motion from the stylus bar, and means for adjusting the angular position of the link with respect to the shoe, for the purpose set forth.

8. In a talking machine, an amplifier comprising a friction roll and a friction shoe applied thereto, a diaphragm connected with one end of the shoe, a stylus bar, a link connecting the stylus bar with the other end of the shoe, and means for adjusting the point of connection between the stylus bar and the link, for the purpose set forth.

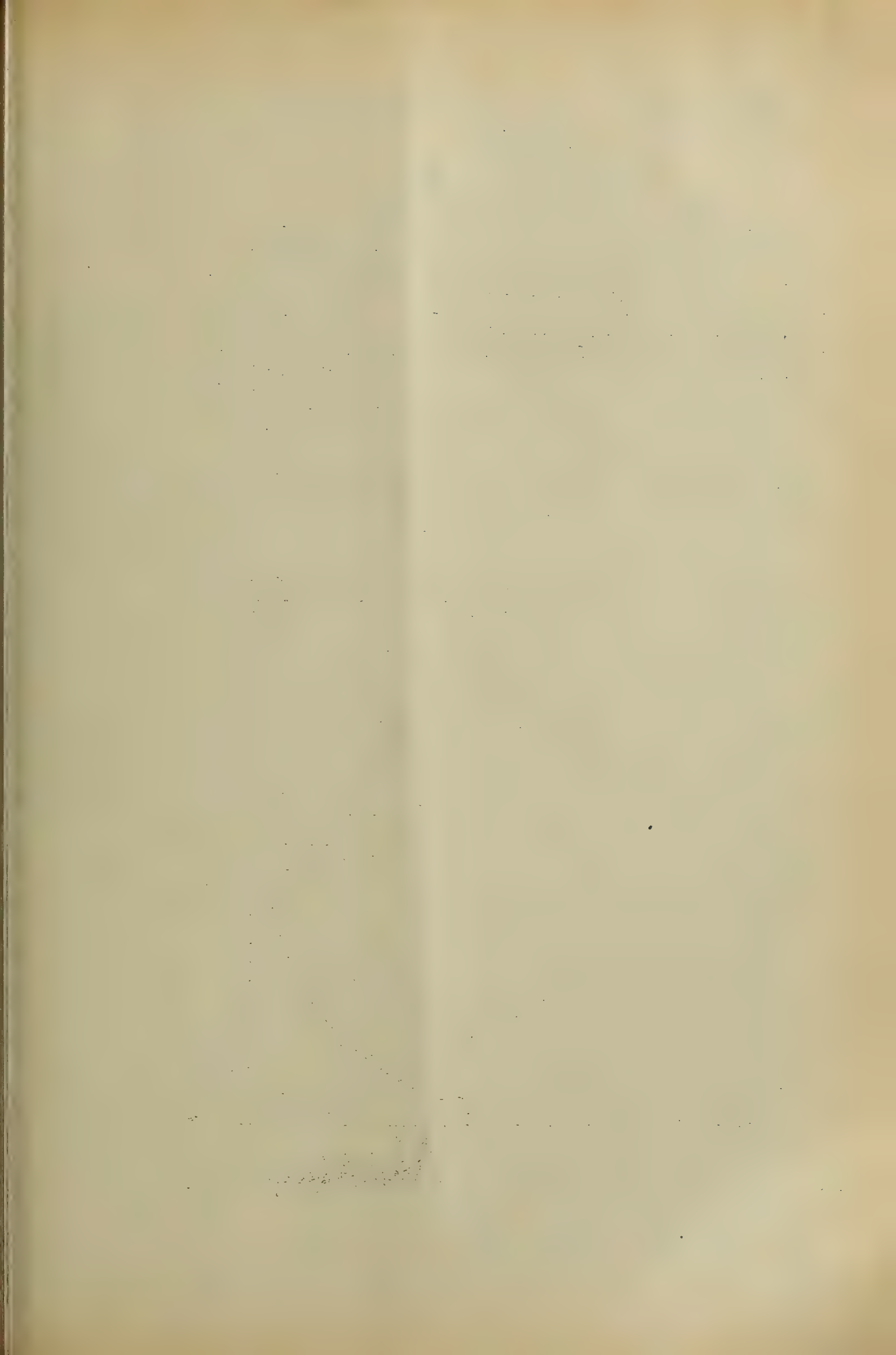
9. In a talking machine, friction means comprising a roll and shoe, a stylus bar carrying a threaded rod, a nut movable along said rod, and connection between the nut and shoe, for the purpose set forth.

In witness whereof, I subscribe my signature, in the presence of two witnesses.

JOHN H. J. HAINES.

Witnesses:

WALDO M. CHAPIN,
MARY S. HANDY.



H. SCHRÖDER.
PHONOGRAPH.

APPLICATION FILED OCT. 17, 1907.

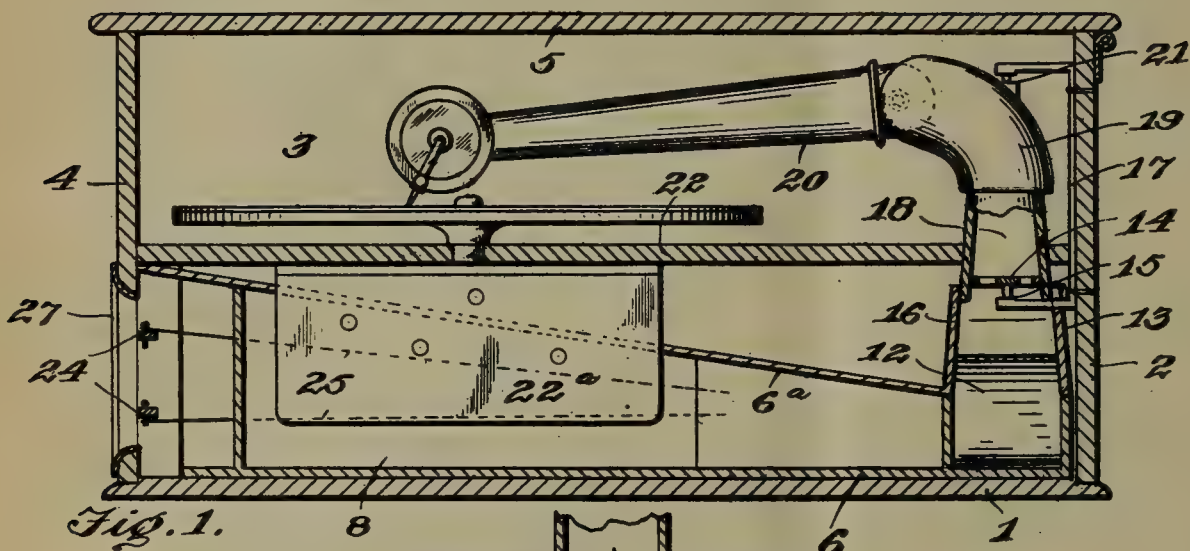
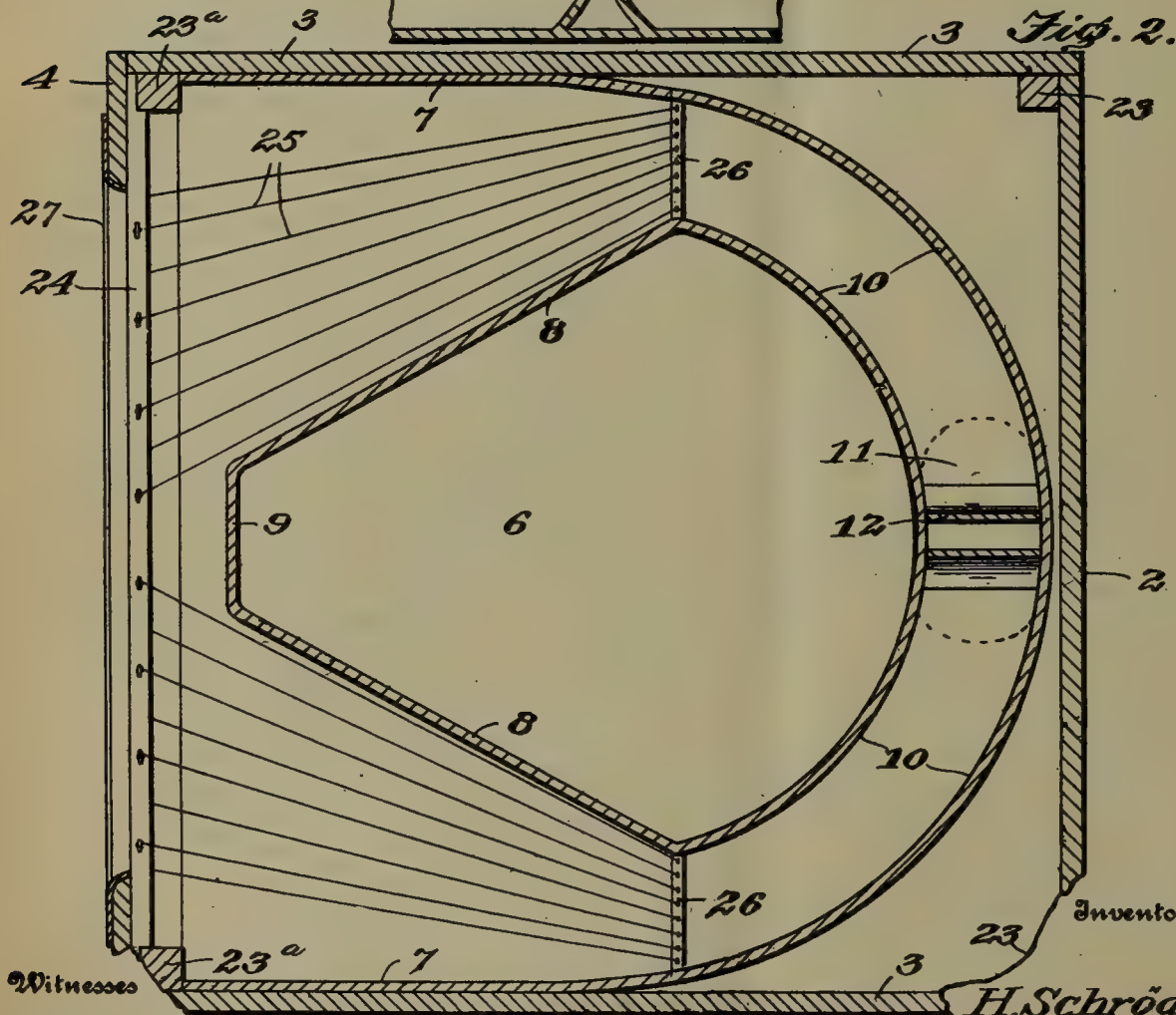


Fig. 3.



Fig. 2.



Witnesses

Inventor

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By

Thos. M. Lacey Attorneys

Helge W. Murray.
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UNITED STATES PATENT OFFICE.

HERMANN SCHRÖDER, OF NEW YORK, N. Y.

PHONOGRAPH.

No. 895,900.

Specification of Letters Patent.

Patented Aug. 11, 1908.

Application filed October 17, 1907. Serial No. 397,923.

To all whom it may concern:

Be it known that I, HERMANN SCHRÖDER, subject of the Emperor of Germany, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

This invention comprehends certain new and useful improvements in phonographs and relates particularly to a casing or sound amplifying means which aims to enhance the character of the sound, and the invention consists in certain constructions and arrangements of the parts that I shall hereinafter fully describe and claim.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawings, in which:

Figure 1 is a longitudinal sectional view of a phonograph embodying the improvements of my invention; Fig. 2 is a horizontal sectional view thereof; and, Fig. 3 is a detail sectional view illustrating a deflector that is employed.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The cabinet of my improved phonograph comprises a bottom 1, a back 2, two sides 3, a front 4, and a lid or cover 5 which may be hinged to swing upwardly at its front end, as shown. This cabinet may be made of any desired wood or other material and is the shell in which my improved sound amplifying means are fitted.

The sound amplifying means of my invention is preferably constructed entirely of rubber, either hard or soft, preferably the former. Except its top, it is formed of one casting, preferably, and embodies sides 7 that extend parallel throughout the major portion of their length, a bottom plate 6, webs 8 between the two sides and diverging forwardly so as to form with the sides outwardly flared sound passages, said webs being connected together at their front ends by a cross web 9, and curved walls 10 which form divergent branches from the lower end of a laterally elongated or elliptical opening 11 at the rear of the casing, a deflector 12 as best seen in Fig. 3, being mounted in said opening, so as to deflect the sound laterally and forwardly through the branches 10 to

the outwardly flared sound passages with which the ends of the branches 10 communicate, as best seen in Fig. 2. The flared sound passages formed by the webs 8 and side walls of the all-rubber casting, communicate at their front ends, it being noted that the web 9 is set back somewhat from the front of the cabinet. The front, is, as shown, formed with a laterally elongated opening registering with the front ends of the said passages to provide for the free issuance of the sound.

The base 13 of the taper arm extends upwardly from the opening 11 and above the upper end of said base portion is a spider 14 having a downwardly projecting pivot or spindle 15 mounted in a bearing on the lower arm of a bracket 17 screwed or otherwise secured to the back 2 of the cabinet. The base portion 13 of the taper arm is formed with an opening 16 for the passage of the lower arm of said bracket. The superposed section of the taper arm carries a spider 14 or is supported thereby, and an elbow 19 is secured to the upper end of the section 18, said elbow being formed with a boss having a socket which receives the spindle 21 projecting downwardly from the upper arm of the bracket 17. These two pivot points are in vertical alinement, as shown, and provide for the horizontal swinging movement of the taper arm 20. This arm is mounted to move up and down in the end of the elbow 19, as clearly indicated in Fig. 1.

The rubber casting constituting the sound amplifying means is provided with a preferably rubber lid 6^a, as seen in Fig. 1, and above this lid is a wooden or other platform 22 designed to support the turn-table for the record and the motor casing 22^a which is suspended therefrom and occupies the open space provided for it at the middle of the rubber casting that forms the sound amplifying means, that is, in the space between the webs 8 and 9 and the front wall of the branches 10. This platform 22 is supported at its rear corners on the corner post 23 of the outside casing or cabinet. It is also supported at its front corners on corresponding posts 23^a, and the latter are rabbeted to receive the ends of the upper and lower cross bars 24. Each one of these cross bars has a number of tuning pegs secured to it, and sympathetic strings 25 in the nature of violin or similar strings are connected to the pegs and extend rearwardly or longitudinally through the respective flared sound

passages, the rear ends of the strings being secured on similar pegs mounted in cross-bars 26 held in the front ends of the branches 10. It is to be noted that there are two cross-bars 24, upper and lower, and that the strings alternately extend from the cross-bars 26 to the upper and lower cross-bars 24. The opening in the front 4 of the cabinet is bounded by a plate 27 which may have a flange extending into the opening so as to give a neat appearance to the front of the cabinet.

From the foregoing description in connection with the accompanying drawings, it will be seen that I have provided a casing or cabinet for a phonograph, which is very compact, the motor casing 22^a being suspended in the open space between the two divergent and flared outlet passages for the sound, instead of being held in a compartment entirely above the sound amplifying means, as is common with this type of phonograph, and that the arrangement of sympathetic strings, together with the material out of which the entire sound amplifying means is constructed, will result in the reproduction of the sound with a resonant and even quality of tone, without the rasping or harsh effects which are so objectionable.

It is to be understood that with my invention, the taper arm tapers continuously from the sound box to the outlet opening in the front 4 of the cabinet, and that the taper arm 20 itself, its elbow 19 and portions 18 and 13 are all of rubber, as are the parts 6, 6^a, 7, 8, 9, 10 and 12.

Having thus described the invention, what is claimed as new is:

1. A talking machine embodying a taper arm, sound amplifying means comprising a cabinet, a casting mounted in said cabinet and consisting of sides, inner webs 8 spaced from said sides and converging forwardly, whereby to form two horizontally disposed outlet passages for the sound, curved walls forming branch passages communicating with the rear ends of said flared outlet passages, and a connection between said branch passages and the taper arm.

2. A talking machine embodying a taper arm, sound amplifying means comprising a cabinet, a casting of rubber mounted in said cabinet and consisting of sides, inner webs 8 spaced from said sides and converging forwardly, whereby to form two horizontally disposed outlet passages for the sound, curved walls forming branch passages communicating with the rear ends of said flared outlet passages, a connection between said branch passages and the taper arm, and a vertically disposed deflector mounted in said branch passages.

3. A talking machine embodying a taper arm, a cabinet, a casing adapted to fit within the cabinet and consisting of a bottom por-

tion, two sides, forwardly diverging webs spaced from the respective sides, curved walls connected at their ends to the sides and rear ends of the webs, respectively, the outer edge of said walls, sides and webs sloping or inclined towards the front, a top or lid adapted to fit down upon the said walls, webs, and sides and formed with an opening designed to provide a middle space between the said walls and webs for the location of a motor casing, and a connection between said walls at the rear of the cabinet and the taper arm.

4. A talking machine embodying a taper arm, a cabinet, a casing adapted to fit within the cabinet and formed with two vertical sides, webs spaced from the sides, curved walls connected at their ends to the rear ends of the sides and webs, respectively, the space between the front of said curved walls and the two webs affording accommodation for the motor casing of the phonograph, and a connection between said curved walls and the taper arm.

5. A talking machine embodying a taper arm, a cabinet, a casing fitting within the cabinet and provided with a middle space and two outlet passages for the sound on opposite sides of said space, a connection between said casing and the taper arm, the said middle space providing for the accommodation of a motor casing, corner posts secured in the cabinet, a platform supported on said posts, a motor casing suspended from said platform and mounted in the middle space of the first named casing, the corner posts at the front of the cabinet being formed with rabbets, upper and lower cross-bars having their ends fitted in the rabbets of the corner posts, the front of the cabinet being formed with an opening across which said bars extend, a single cross-bar located in each of the said outlet passages for the sound and at the rear ends thereof, and sympathetic strings secured to the last named cross-bars at one end and alternately to the upper and lower cross-bars at their front ends.

6. A talking machine embodying a taper arm, a cabinet, sound amplifying means mounted in said cabinet and connected at the rear end of the cabinet to the taper arm and divided and extending forwardly from the taper arm to provide divergent passages, said passages merging together at the front of the cabinet and the cabinet being formed with an opening at said point, and two series of sympathetic strings, the respective series extending from the front opening in the cabinet through the front portions of said passages, and supports for said strings.

7. A talking machine embodying a taper arm, a cabinet, sound amplifying means mounted in said cabinet and connected at the rear end of the cabinet to the taper arm and divided and extending forwardly from

the taper arm to provide divergent passages, said passages merging together at the front of the cabinet and the cabinet being formed with an opening at said point, and two series
5 of sympathetic strings, the respective series extending from the front opening in the cabinet through the front portions of said passages, the strings of each series extending alternately in downwardly inclined and up-
10 wardly inclined directions, and supports for said strings.

8. A talking machine embodying a taper arm, a cabinet, a sound amplifying means mounted in said cabinet, said sound ampli-
15 fying means being connected at the rear end

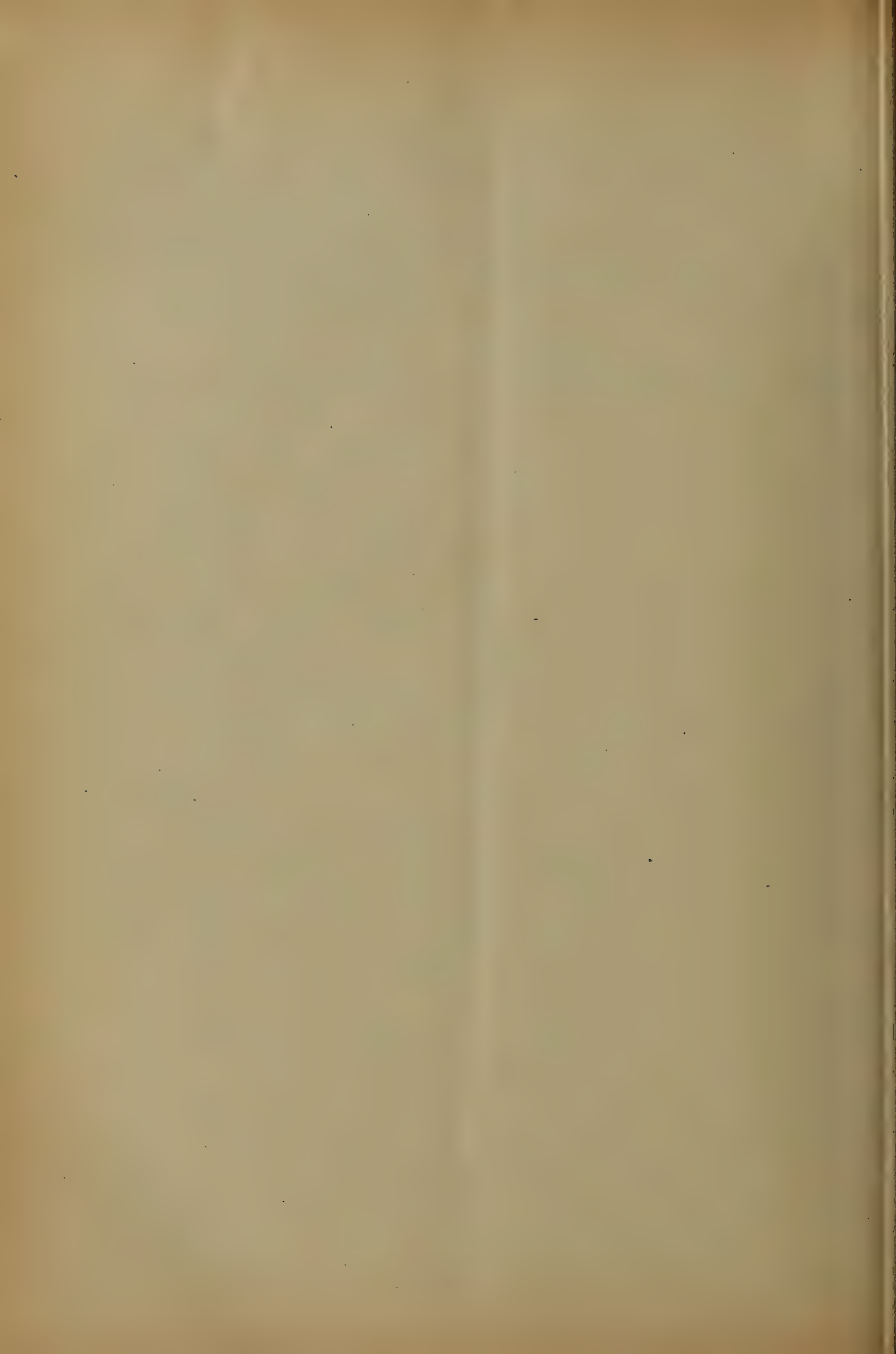
of the cabinet to the taper arm and being provided with passages extending forwardly from the taper arm and spaced from each other to provide a middle space for the accommodation of a motor casing within the
20 cabinet, the cabinet being formed at its front with an opening with which the forward ends of said passages communicate.

In testimony whereof I affix my signature in presence of two witnesses.

HERMANN SCHRÖDER. [L. s.]

Witnesses:

FREDERICK S. STITT,
W. N. WOODSON.





No. 896,006.

PATENTED AUG. 11, 1908.

E. D. GLEASON.
SOUND BOX.

APPLICATION FILED NOV. 14, 1907.

3 SHEETS—SHEET 1.

Fig. 3.

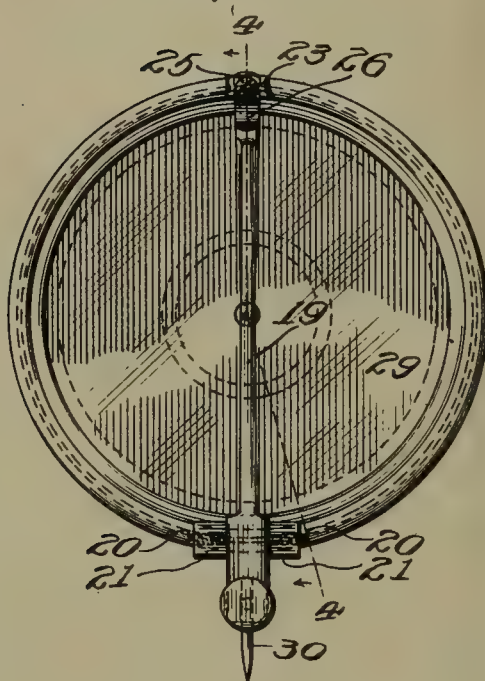


Fig. 4.

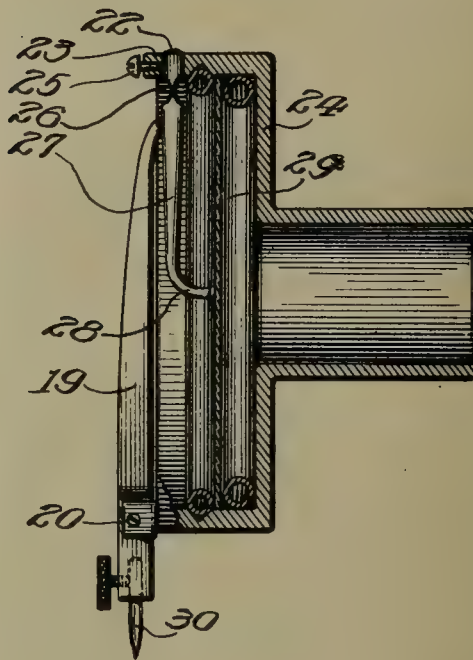


Fig. 1.

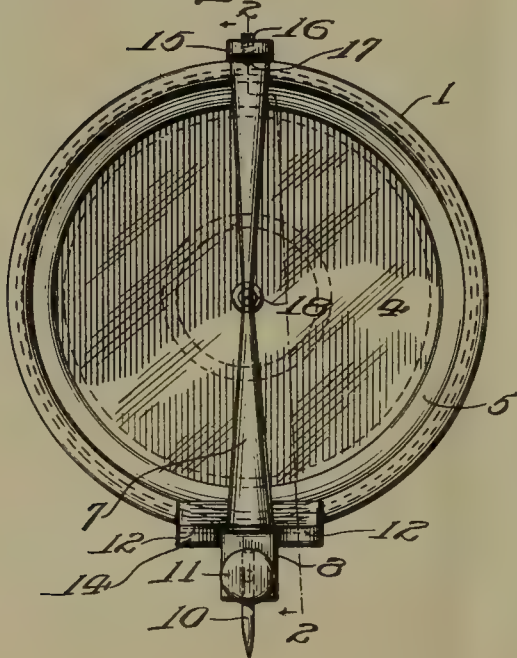
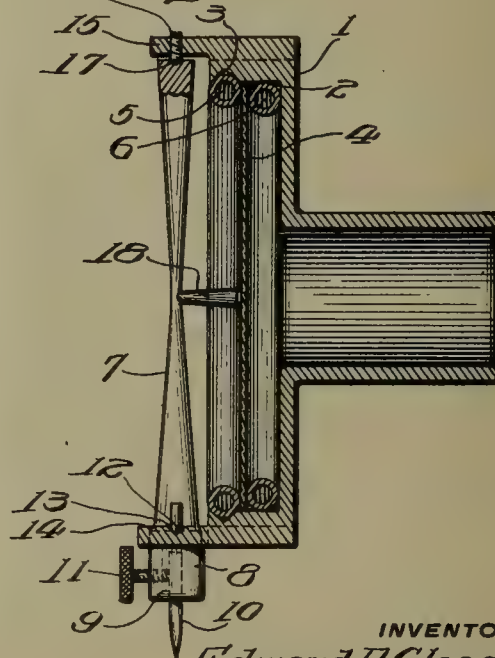


Fig. 2.



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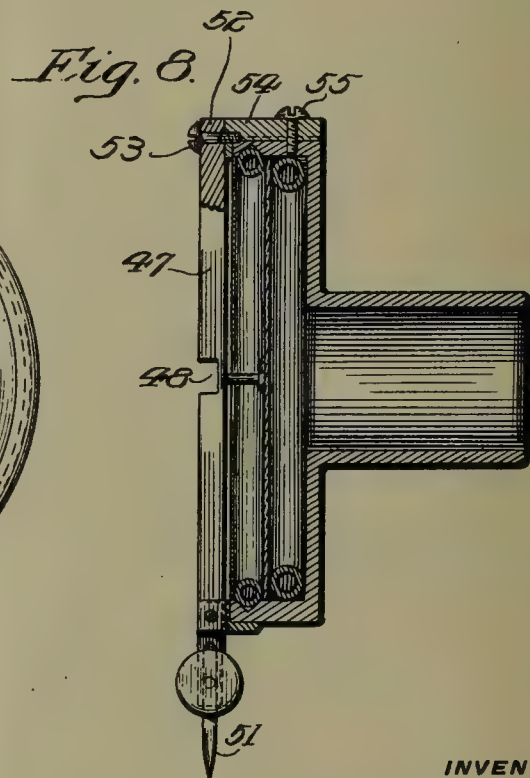
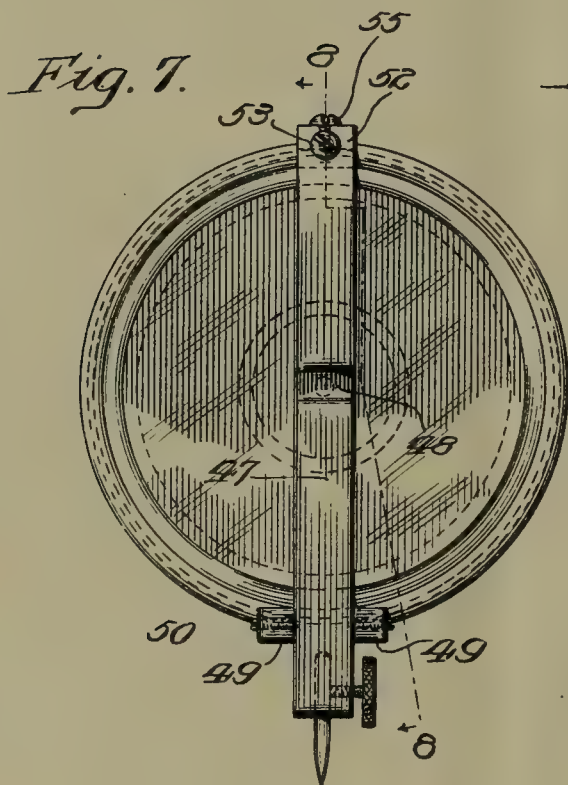
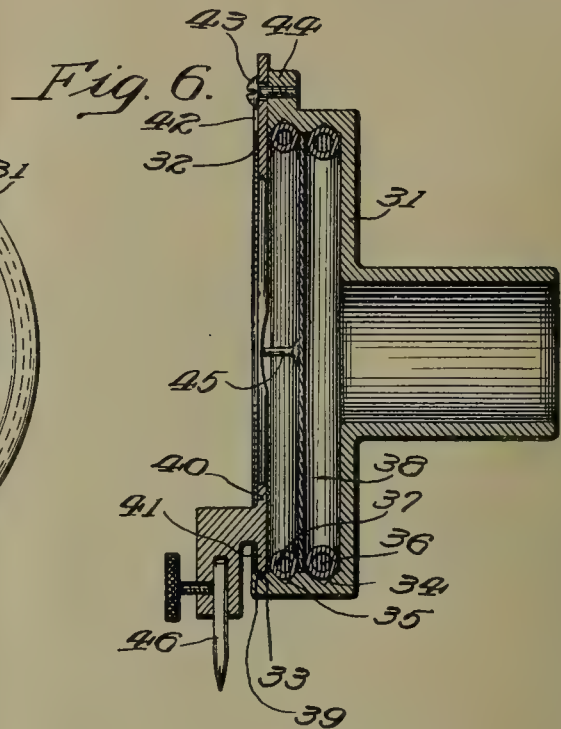
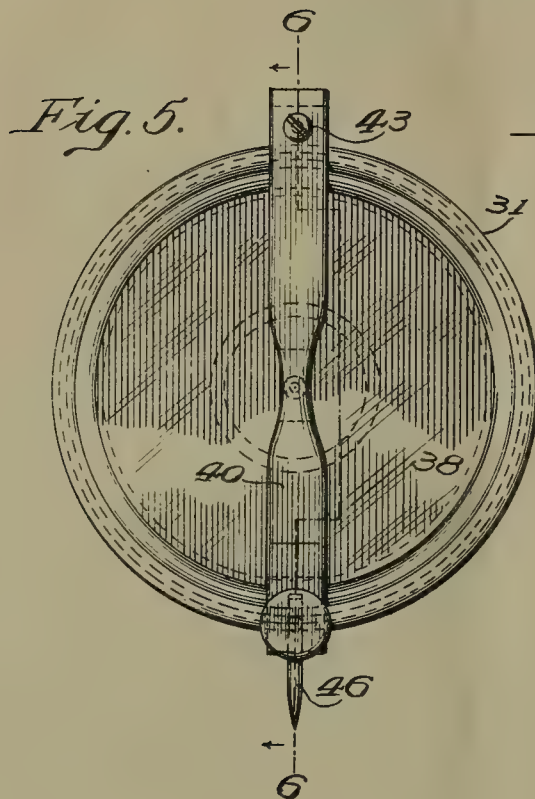
ATTORNEY



E. D. GLEASON.
SOUND BOX.

APPLICATION FILED NOV. 14, 1907.

3 SHEETS—SHEET 2.

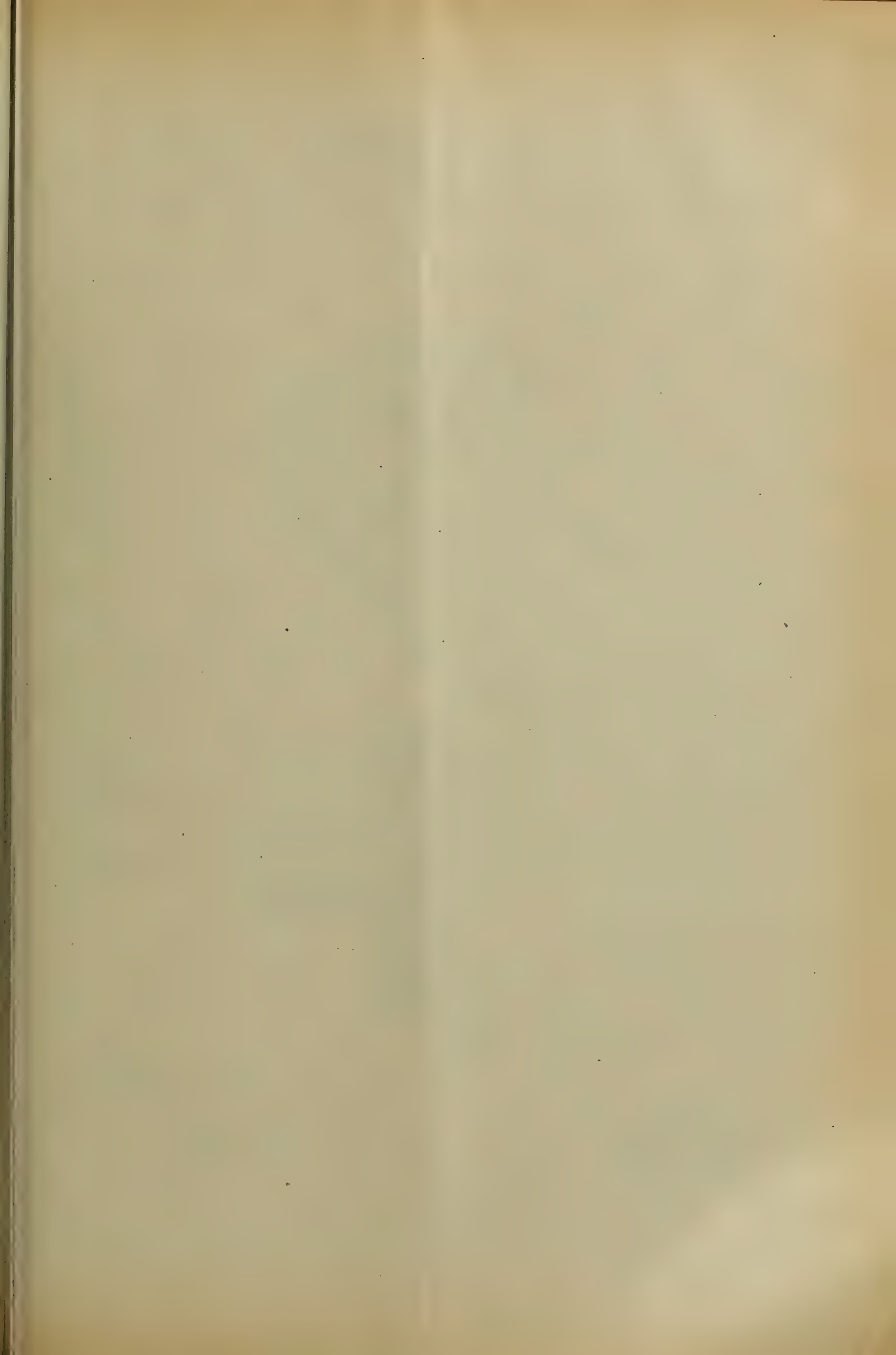


WITNESSES
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INVENTOR
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1 June 1908.

ATTORNEY



No. 896,006.

PATENTED AUG. 11, 1908.

E. D. GLEASON.
SOUND BOX.

APPLICATION FILED NOV. 14, 1907.

3 SHEETS—SHEET 3.

Fig. 9.

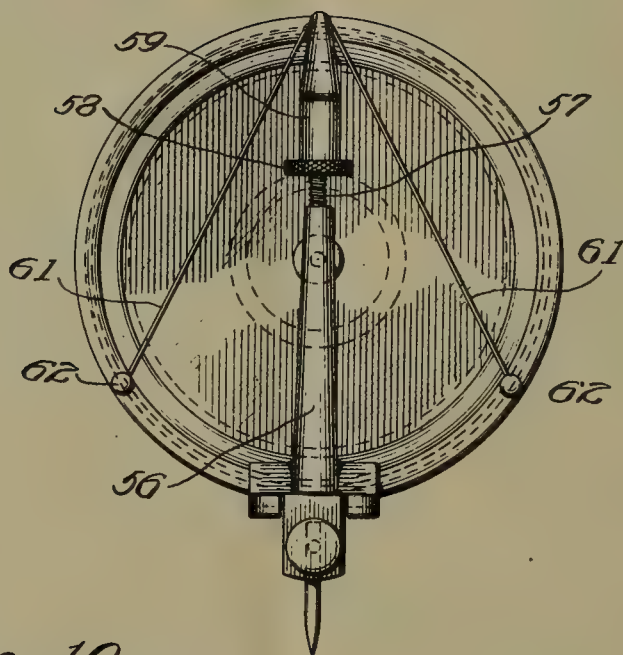
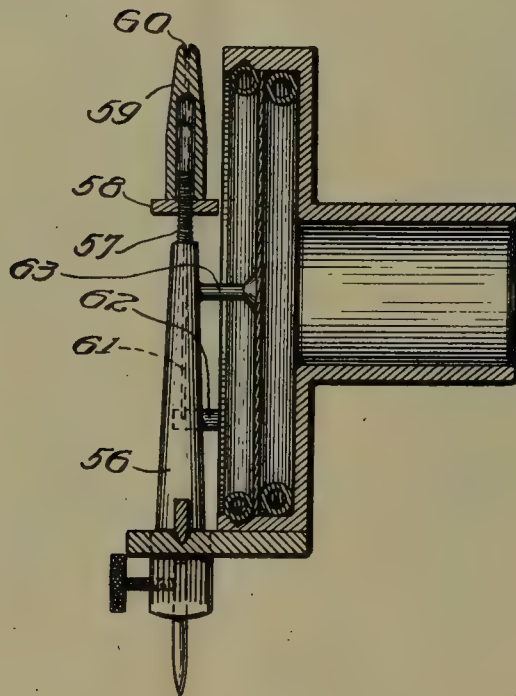


Fig. 10.



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1 June 1908.

ATTORNEY

UNITED STATES PATENT OFFICE.

EDWARD D. GLEASON, OF MOORES, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX.

No. 896,006.

Specification of Letters Patent.

Patented Aug. 11, 1908.

Application filed November 14, 1907. Serial No. 402,057.

To all whom it may concern:

Be it known that I, EDWARD D. GLEASON, a citizen of the United States, and a resident of Moores, Delaware county, and State of Pennsylvania, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a full, clear, and complete disclosure.

The main objects of this invention are to simplify the construction of the sound box and to provide an improved stylus bar and stylus bar mounting.

Other objects will be set forth as the invention is further explained.

In the accompanying drawings: Figure 1 is a front elevation of a sound box constructed in accordance with this invention; Fig. 2 a longitudinal section on line 2—2 of Fig. 1; Fig. 3 a front elevation of a modified form of this invention; Fig. 4 a longitudinal section on line 4—4 of Fig. 3; Fig. 5 a front elevation of a second modification of this invention; Fig. 6 a longitudinal section on line 6—6 of Fig. 5; Fig. 7 a front elevation of a third modification of this invention; Fig. 8 a longitudinal section on line 8—8 of Fig. 7; Fig. 9 a front elevation of a fourth modification of this invention; and Fig. 10 is a longitudinal central section of Fig. 9.

Referring to the drawings, particularly to Figs. 1 and 2, the device comprises a casing 1 having a cylindrical bore 2 provided near the front edge of the casing with a V shaped groove 3. The diaphragm 4 is held between two rubber gaskets 5 and 6, the outer one of which rests within the said groove 3, and the inner one of which is of smaller diameter than the outer one and rests in the angle between the bore of the box and the rear wall thereof.

The stylus bar 7 extends diametrically across the front of the box, one end of the bar 8 projecting outside of the periphery of the casing, and being provided with the usual socket 9 for holding the stylus needle 10, the needle being held in place by the screw 11. The stylus bar is supported upon knife edges 12 projecting upon opposite sides of the bar and integral therewith, and extending in a direction parallel to the diaphragm and perpendicular the longitudinal axis of the bar. These knife edges rest within V shaped

grooves 13 in the inner surface of spaced lugs 14, which extend outwardly from the casing upon each side of the bar, the lugs being either integral with the casing or formed of a separate piece or pieces secured to the casing. The bar tapers inwardly from its mounting to a point opposite the central portion of the diaphragm from whence it gradually increases in diameter toward its opposite end, which terminates adjacent the inner surface of a lug 15 projecting outwardly from the casing, the lug 15 being either integral with the casing or formed of a separate piece secured thereto. A screw 16 having a conical point 17 is threaded through the lug 15, and engages a conical socket in the end of the bar to hold the bar upon its mounting. The reduced central portion of the bar is phonetically connected to the diaphragm by means of a rod 18.

With this construction in mind, it is evident that when the stylus needle is put into operative engagement with the sound record that the stylus bar will be flexed at its central weakened portion to permit the bar to oscillate between the knife edge bearing upon one side of the box, and the conical screw on the opposite side of the box, thus causing the diaphragm to vibrate in accordance with the sound record. It is also obvious that this form of sound box may be used for recording as well as for reproducing sounds. By this construction, a pressure may be put upon the stylus bar longitudinally to tension it, to prevent its too free vibration and to keep it in engagement with the sound record. Furthermore the particular form of casing used in this box is in a single piece, which may be cheaply constructed and which permits of the easy insertion or removal of the diaphragm and its supporting gaskets.

In Figs. 3 and 4 I have shown the first modification of this invention. This form is like the preceding, except that the stylus bar 19 is pivoted between screws 20 having conical hubs fitting in corresponding sockets in the sides of the bar, the screws 20 being threaded into lugs 21 similar to those already described. Upon the opposite side of the casing the bar terminates in a cylindrical end 22, which passes through a correspond-

ing aperture in the lug 23 rigid with the sound box casing 24, as heretofore described, this end of the bar being held in fixed position by means of the screw 25, which is threaded through the outer side of the said lug. Furthermore, instead of being weakened centrally, the bar is weakened adjacent its end at 26 just within the sound box casing, and from this point an arm or branch 27 of the bar extends inwardly in a radial direction, terminating in an end 28 curved to meet the central portion of the diaphragm 29, to which it is phonetically connected. By this construction, the action of the stylus is similar to the combination of two levers, in which the power is applied to the short arm of one lever, and is transmitted from the long arm of the lever to act upon the short arm of the second lever to produce an increased amount of motion at the terminus of the long arm of the second lever. Thus any movement of the stylus needle 30, which is secured as usual to the free end of the stylus bar, would result in an amplified movement of the diaphragm; and in reproducing or in recording sounds, the diaphragm would have a much greater leverage upon the stylus needle than has heretofore been provided in sound boxes of this character.

In the second modification of this invention, which is shown in Figs. 5 and 6, the casing 31 is provided with a cylindrical bore 32 having three V shaped grooves 33, 34 and 35 respectively, the inner of which 34 and 35 are provided for the reception of the gaskets 36 and 37 to hold the diaphragm 38 in position, and the outer groove 33, which is adjacent the front edge of the casing, is provided to form a seat for the knife edge 39 which supports the stylus bar 40, the knife edge 39 being upon a projection 41 integral with and in alinement with the central portion of the bar, which extends diametrically across the front of the box and is secured at its end opposite the knife edge in a recess 42 in the sound box casing by means of a screw 43, which is threaded into a lug 44 upon the casing. The central portion of the bar is weakened by lateral recesses at a point opposite the center of the diaphragm and is phonetically connected to the diaphragm by means of a rod 45. The portion of the bar adjacent the knife edge is offset and projects beyond the periphery of the casing, and is provided with the usual socket carrying a stylus needle 46. The operation of this box is similar to those already described.

In the fourth modification of this invention, which is shown in Figs. 7 and 8, the stylus bar 47 is substantially rectangular in shape and oblong in cross section, and is weakened centrally by means of a transverse rectangular groove 48 in the front thereof, the bar being pivoted between the lugs 49 upon the screws 50 adjacent its free end, which car-

ries the stylus point 51, and being fixed at its opposite end 52 to the front of the casing by means of a screw 53 extending into a lug 54 which is secured to the casing by means of the screw 55. The operation of this box is similar to that of those already described.

In the fifth modification of this invention, which is shown in Figs. 9 and 10, the stylus 56 is mounted upon the knife edges in the manner already described and shown in Figs. 1 and 2. The inner end of the bar terminates in a reduced threaded end 57 carrying a knurled nut 58 and a hollow cap 59 resting loosely over the threaded end projecting through the nut, the inner end of the cap engaging against the outer surface of the knurled nut. The upper end of the cap is provided with a slot 60 through which passes a tie-rod 61, the ends of the tie-rod being secured upon the opposite sides of the stylus bar to the casing by means of the pins 62, the ends of the tie-rod being threaded obliquely with respect to the stylus bar. The portion of the stylus bar opposite the center of the diaphragm is phonetically connected to the diaphragm by means of the rod 63. By this construction the stylus bar is held upon its mounting by means of the tie-rod 61, and more or less pressure may be applied longitudinally of the rod by means of the knurled nut to hold the bar upon its mounting. After the bar has been adjusted upon its mounting, its operation is similar to that already described.

Although I have shown only a few of the forms in which this invention may be constructed, I do not limit myself to any particular form, as other modifications might be made in the embodiment of this invention and in the details of its construction within the scope of the appended claims, without departing from the spirit of this invention or sacrificing any of the advantages thereof.

Having thus fully described my invention, what I claim and desire to protect by Letters Patent of the United States is:

1. In a sound box, the combination with a casing, of a stylus bar, a mounting for said bar facing inwardly of said casing, and means acting longitudinally of said bar to hold the same upon its mounting.

2. In a sound box, the combination with a casing of a diaphragm, a stylus bar, means for phonetically connecting said bar intermediate of its ends to said diaphragm, a mounting for said bar adjacent one end thereof, and means secured to said casing and engaging rigidly against the opposite end of said bar to restrain said bar upon its mounting.

3. In a sound box, the combination with the casing of a diaphragm, a stylus bar, means for phonetically connecting said bar intermediate of its end to said diaphragm, a mounting for said bar facing inwardly with respect to said casing, and means acting upon

said bar at one end thereof to hold said bar upon its mounting, said bar being weakened at a point intermediate of its ends.

4. In a sound box, the combination with a casing, of a diaphragm, a stylus bar, means for phonetically connecting said bar intermediate of its ends to said diaphragm, a knife edge upon which said bar is mounted adjacent one end preventing said end from moving longitudinally outwardly, and means at the opposite end of said bar to restrain the movement of said bar upon its mounting.

5. In a sound box, the combination with a casing, of a diaphragm, a stylus bar, means for phonetically connecting said bar intermediate of its ends to said diaphragm, a knife edge upon which said bar is mounted at one end preventing said end from moving longitudinally outwardly, and means at the opposite end, and held in position by said casing, to restrain the movement of said bar upon its mounting.

6. In a sound box, the combination with a casing, of a diaphragm, a stylus bar, means phonetically connecting said bar intermediate of its ends to said diaphragm, a knife edge upon which said bar is mounted, and a pin threaded into said casing and engaging the end of said bar to hold said bar upon its mounting.

7. In a sound box, the combination with a casing, of a stylus bar pivoted adjacent one end to one side of said casing and terminating at its opposite end adjacent the opposite side of said casing, and means passing through said casing and engaging the end of said bar to restrain the same upon its mounting.

8. In a sound box, the combination with a casing, of a flexible stylus bar pivoted to one side of said casing and terminating adjacent the opposite side thereof, and means secured to said opposite side and engaging rigidly against said bar to restrain the movement thereof.

9. In a sound box, the combination with a casing, of a diaphragm, a flexible stylus bar pivoted to one side of said casing and terminating adjacent the opposite side thereof, means secured to said opposite side and rigidly engaging said bar to restrain the movement thereof, and means phonetically connecting said bar and said diaphragm.

10. In a sound box, the combination with a casing, of a diaphragm, a stylus bar pivoted to one side of said casing and terminating adjacent the opposite side thereof, means secured to said opposite side and rigidly engaging said bar to restrain the movement thereof, said bar having a weakened portion, and means phonetically connecting the weakened portion of said bar to said diaphragm.

11. In a sound box, the combination with a casing, of a stylus bar, an inwardly facing bearing for said bar upon one side of said cas-

ing, and means secured to said casing and rigidly acting upon the bar adjacent the other side of said casing to press the bar upon its bearing.

12. In a sound box, the combination with a casing, of a stylus bar, an inwardly facing bearing for said bar upon one side of said casing, said bar extending inwardly and outwardly from said bearing and means secured to said casing and rigidly acting upon the inner end of said bar to press said bar upon said bearing.

13. In a sound box the combination with a casing, of a stylus bar mounted to oscillate upon an axis fixed with respect to said casing, and means secured to said casing and rigidly engaging said bar at a point spaced from said axis, and acting in a direction toward the axis, to restrain the movement of said bar.

14. In a sound box the combination with a casing, of a flexible stylus bar mounted to oscillate upon an axis fixed with respect to said casing, and means secured to said casing and rigidly engaging said bar at a point spaced from said axis, and acting in a direction toward the axis, to restrain the movement of said bar.

15. In a sound box the combination with a casing, of a diaphragm, a stylus bar mounted to oscillate upon an axis fixed with respect to said casing, means secured to said casing and rigidly engaging said bar at a point spaced from said axis to restrain the movement of said bar, and means phonetically connecting said bar to said diaphragm between said axis and acting toward the axis and said point.

16. In a sound box the combination with a casing, of a diaphragm, a flexible stylus bar mounted to oscillate upon an axis fixed with respect to said casing, means secured to said casing and rigidly engaging said bar at a point spaced from said axis and acting toward the axis to restrain the movement of said bar, and means phonetically connecting said bar to said diaphragm between said axis and said point.

17. In a sound box the combination with a casing, of a stylus bar, a mounting therefor, and means independent of said mounting secured to said casing and rigidly engaging said bar and acting toward said mounting to hold said bar upon its mounting.

18. In a sound box the combination with a casing, of a stylus bar, a mounting therefor, and means independent of said mounting secured to said casing and rigidly engaging said bar and acting toward said mounting to restrain the oscillation of said bar.

19. In a sound box the combination with a casing, of a flexible stylus bar, a mounting therefor, and means independent of said mounting secured to said casing and rigidly engaging said bar and acting toward said

mounting to restrain the oscillation of said bar.

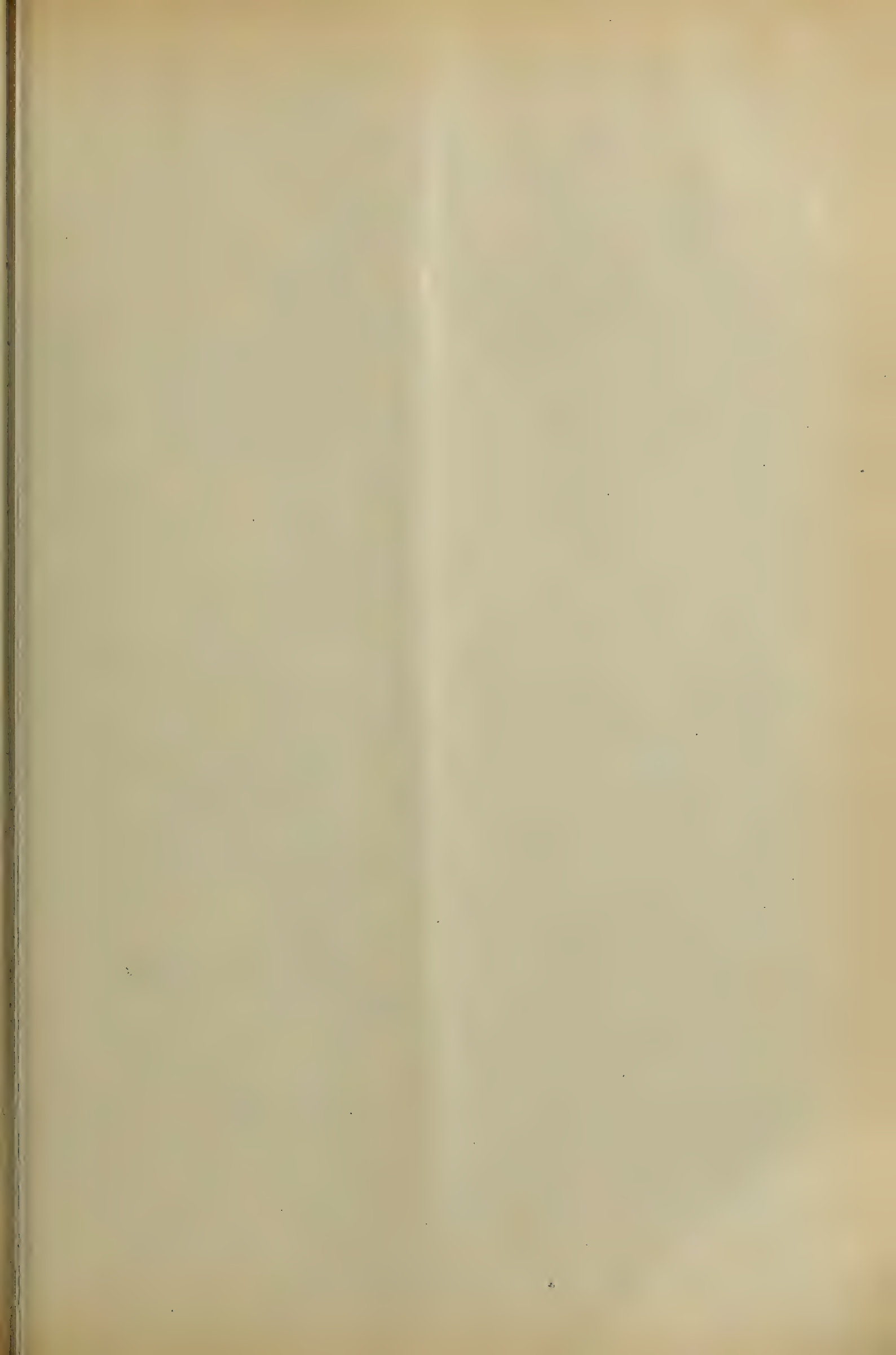
20. In a sound box the combination with a casing, of a stylus bar, a mounting for said
5 bar facing inwardly of said casing, and means tending to force said bar outwardly from said casing to hold said bar upon its mounting.

In witness whereof I hereunto set my hand this 13th day of November A. D., 1907.

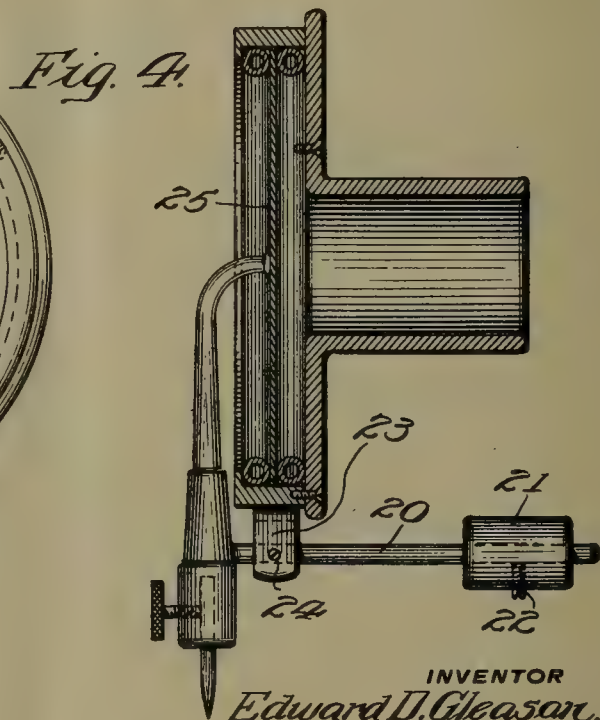
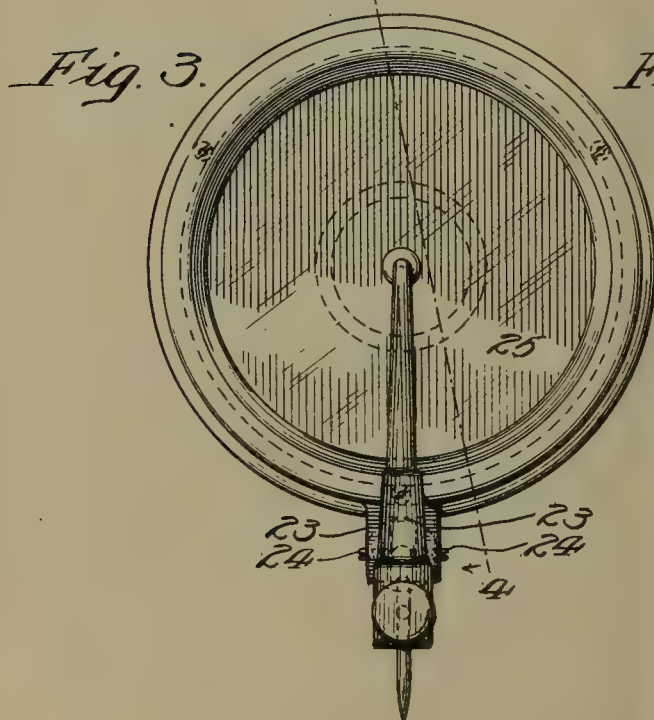
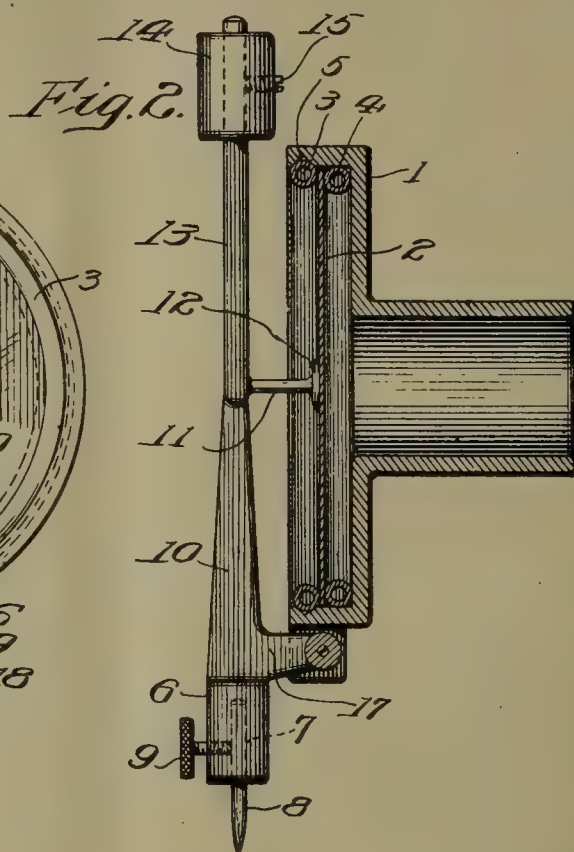
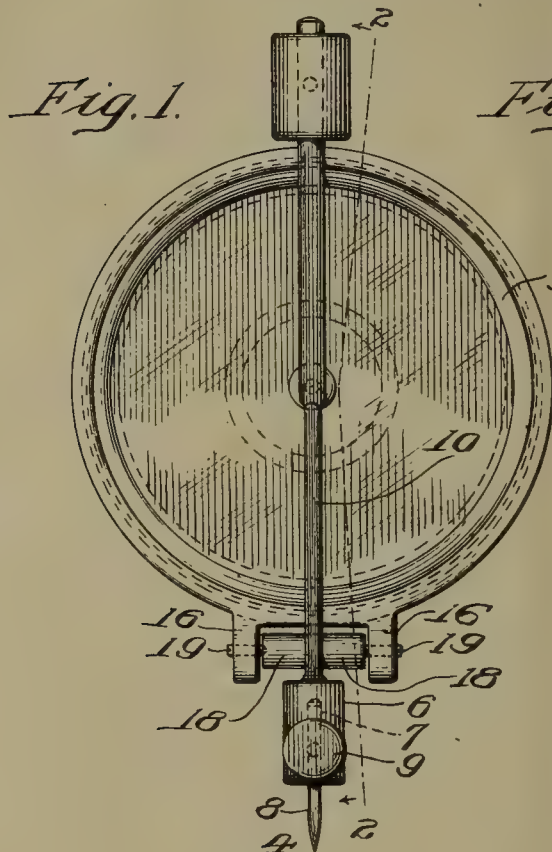
EDWARD D. GLEASON.

Witnesses:

A. I. GARDNER,
ALEXANDER PARK.



E. D. GLEASON.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED NOV. 14, 1907.



WITNESSES
H. J. Hartman.
A. J. Gardner.

BY

INVENTOR
Edward D. Gleason.
John P. Kelly.

ATTORNEY

UNITED STATES PATENT OFFICE.

EDWARD D. GLEASON, OF MOORES, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX FOR TALKING-MACHINES.

No. 896,007.

Specification of Letters Patent.

Patented Aug. 11, 1908.

Application filed November 14, 1907. Serial No. 402,058.

To all whom it may concern:

Be it known that I, EDWARD D. GLEASON, a citizen of the United States, and a resident of Moores, Delaware county, Pennsylvania, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a full, clear, and complete disclosure.

This invention relates to improvements in sound boxes for talking machines, and has for its main object to provide a box having an improved stylus mounting whereby a weight may be used to counterbalance the stylus.

Other objects will appear in the following description.

The invention consists in the novel construction, combination and arrangement of parts hereinafter set forth and particularly pointed out in the claims and illustrated in the accompanying drawings, in which

Figure 1 is a front elevation of a sound box constructed in accordance with this invention; Fig. 2 a longitudinal section of the same on line 2—2 of Fig. 1; Fig. 3 a front elevation of a modified form of this invention and Fig. 4 a longitudinal section on line 4—4 of Fig. 3.

Referring to the drawings, my improved sound box comprises the usual casing 1, in the bore of which is supported the usual diaphragm 2, which is held in place by means of gaskets 3, 4, the bore of the sound box being provided adjacent its outer edge with a V-shaped annular groove 5, to receive the outer gasket 3, which is sprung into place, the inner gasket 4 resting between the inner cylindrical wall and the rear wall of the box and holding the diaphragm against the outer gasket.

The stylus bar has, as is usual, a cylindrical lower end 6, provided with a longitudinal socket 7 for the reception of the stylus needle 8, which is held in place by the screw 9. The upper part 10 of the stylus bar is flattened in a direction longitudinally of the box and tapered toward the axis of the box where it is divided into two branches, one of which, 11, extends axially of the box and is adapted to form the connection between the stylus bar and the diaphragm, being phonetically connected at its outer end to the diaphragm by wax 12 or any other well-known means, and the other branch 13 extends in the same direction as the main portion of the bar, upwardly,

and projects beyond the outer periphery of the sound box casing. This portion of the bar is preferably of uniform diameter, and carries a weight 14, which is adjustably mounted to be slid longitudinally of the bar, and held in any fixed position by means of the set screw 15. The lower portion of the stylus bar is pivoted between the two parallel lugs 16 extending downwardly from the sound box casing, the lower flattened portion of the stylus bar being provided with a lateral extension 17 carrying trunnions 18, the ends of which lie between the said lugs 16 upon the sound box casing, and being pivotally connected thereto by means of set screws 19 having conical inner ends which rest in suitable sockets in the ends of the trunnions. The lugs upon the sound box casing and the pivots are preferably arranged, as illustrated, to bring the axis of oscillation of the stylus bar substantially in the plane of the diaphragm, and the stylus is thus free to vibrate in a plane perpendicular to the diaphragm, the motion of the inner end of the connecting arm 11 being also substantially perpendicular to the plane of the diaphragm.

The function of the movable weight 14 upon the stylus bar is similar to that of a fly wheel upon an engine, in that it takes up the energy transmitted by the movement of the stylus at the beginning of the movement of the stylus in one direction, giving out the energy again at the end of the movement of the stylus to continue the motion of the upper end of the stylus bar in its original direction, thus increasing the amplitude of vibration of the diaphragm. A further function of the weight is to keep the stylus needle in close contact with the surface of the record groove by which it is being moved during its motion in either direction.

In Figs. 3 and 4 I have illustrated a modified form of this invention, in which the upwardly extending arm of the stylus bar shown in Figs. 1 and 2 is omitted, and an arm 20, for a similar purpose, is extended from the lower portion of the stylus bar in a direction substantially parallel to the axis of the sound box, the weight 21 in this case being slidably mounted upon the arm 20, and fixed in any desired position by the set screw 22, to act upon the stylus, as already explained. This arm 20 is pivoted between lugs 23, extending downwardly from the sound box casing by means of the set screws 24 having conical

points fitting into corresponding sockets of the said arm 20. The axis of oscillation of the stylus bar in this modified form is preferably arranged in the plane of the diaphragm to permit the stylus bar to vibrate in a plane perpendicular to the diaphragm as heretofore explained for the previous form of this invention. The omission of the upwardly extending arm of the stylus bar renders it unnecessary to have a right-angled connecting arm between the stylus bar and the diaphragm, the upper end of the stylus bar being curved inwardly and phonetically connected to the diaphragm at 25, as usual.

It is obvious that this style of sound box may be used in connection with either records having vertically undulating grooves or with records having laterally undulating grooves, and it is furthermore obvious that many changes might be made in the details of construction of this box beyond what I have shown and described, within the scope of the appended claims, without departing from the spirit of this invention, or sacrificing any of the advantages thereof.

Having thus fully described my invention, what I claim and desire to secure by Letters Patent of the United States is:

1. In a sound box, the combination with a diaphragm of a stylus bar, an arm phonetically connected at one end to said diaphragm and at its other end to said bar, an arm forming part of said bar extending outwardly from the axis of said box, and a weight slidably connected to the outer end of said arm.

2. In a sound box, the combination with a diaphragm of a stylus bar, an arm phonetically connected at one end to said diaphragm and at its other end to said bar, an arm forming part of said bar extending outwardly from the axis of said box, and means connected to the outer end of said arm to counterbalance said stylus bar.

3. In a sound box, the combination with a casing, of a diaphragm, a stylus bar pivotally connected to said casing and phonetically connected to said diaphragm and a weight mounted upon said bar to counter balance the same.

4. In a sound box, the combination with a casing, of a diaphragm, a stylus bar pivoted to said casing and phonetically connected to said diaphragm, an arm extending from said bar and integral therewith and a weight upon said arm.

5. In a sound box, the combination with a

casing, of a diaphragm, a stylus bar pivoted to said casing and phonetically connected to said diaphragm, an arm extending from said bar and integral therewith and a weight adjustably mounted upon said arm.

6. In a sound box, the combination with a casing, of a diaphragm, a stylus bar pivoted to said casing and phonetically connected to said diaphragm, an arm extending from said bar and integral therewith and a weight slidably mounted upon said arm.

7. In a sound box, the combination with a casing, of a diaphragm, a stylus bar pivoted adjacent one end to said casing, and phonetically connected axially of said casing to said diaphragm, an arm integral with said bar extending outwardly from the axis of said casing, and a weight upon said arm to counter balance said stylus bar.

8. In a sound box, the combination with a casing, of a diaphragm, a stylus bar pivoted adjacent one end to said casing, and phonetically connected axially of said casing to said diaphragm, an arm integral with said bar extending outwardly from the axis of said casing, and a weight adjustably mounted upon said arm to counter balance said stylus bar.

9. In a sound box, the combination with a casing, of a stylus bar having a rearward extension provided with oppositely extending trunnions having sockets in the ends thereof, lugs upon said casing projecting over the ends of said trunnions, and conical bearings carried by said lugs and engaging in said sockets to support said bar.

10. In a sound box, the combination with a casing, of a stylus bar mounted to oscillate upon said casing, and a weight mounted upon said bar to counterbalance the same.

11. In a sound box, the combination with a casing, of a rigid stylus bar mounted to oscillate upon said casing, and a weight mounted upon said bar to counter-balance the same.

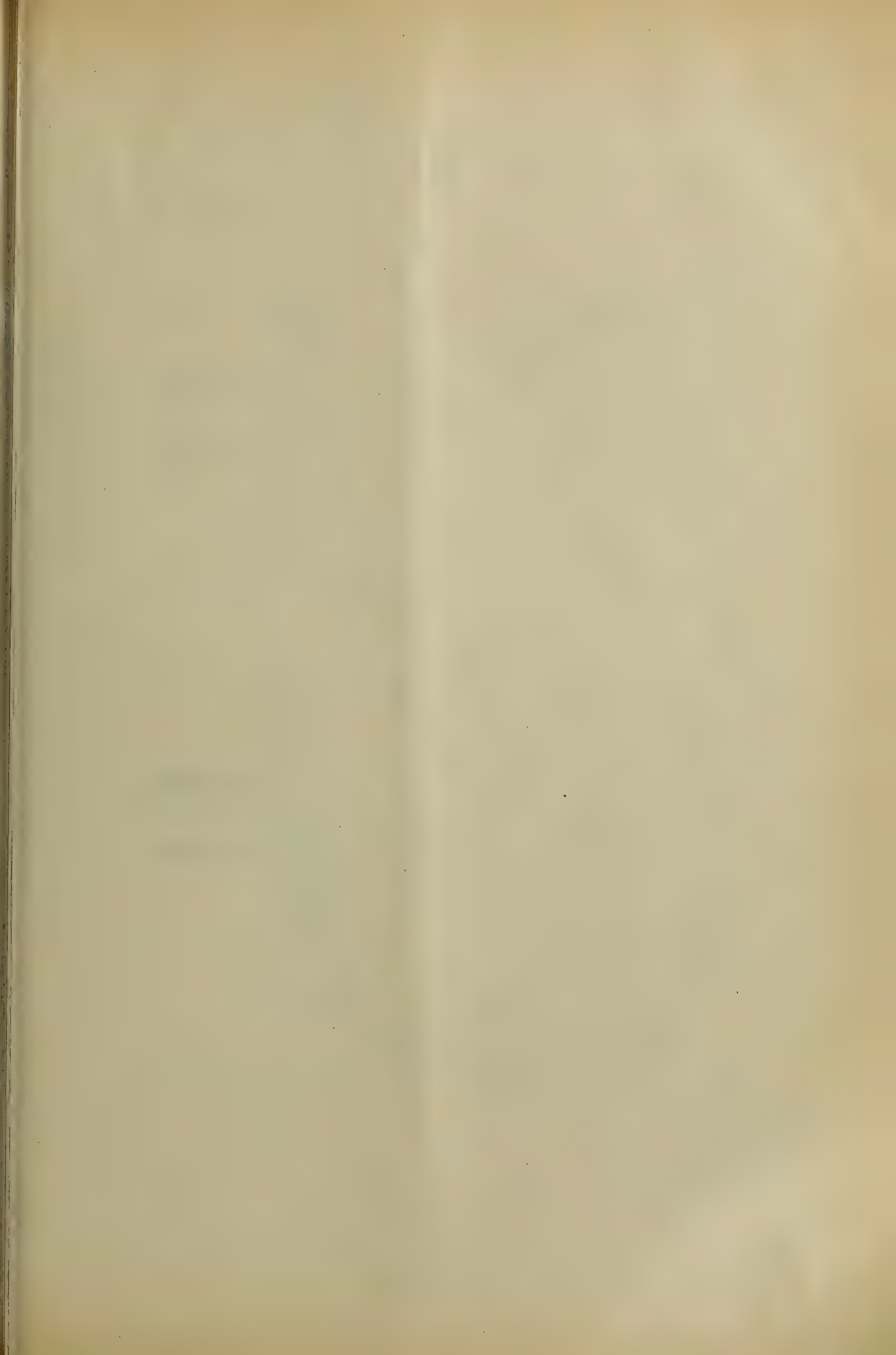
12. In a sound box, the combination with a casing, of a diaphragm, a stylus bar mounted to oscillate upon said casing and phonetically connected to said diaphragm, and a weight mounted upon said bar to counterbalance the same.

In witness whereof I have hereunto set my hand this 13th day of November, A. D., 1907.

EDWARD D. GLEASON.

Witnesses:

A. J. GARDNER,
ALEXANDER PARK.



E. D. GLEASON.
SOUND BOX.

APPLICATION FILED NOV. 14, 1907.

2 SHEETS—SHEET 1.

Fig. 4

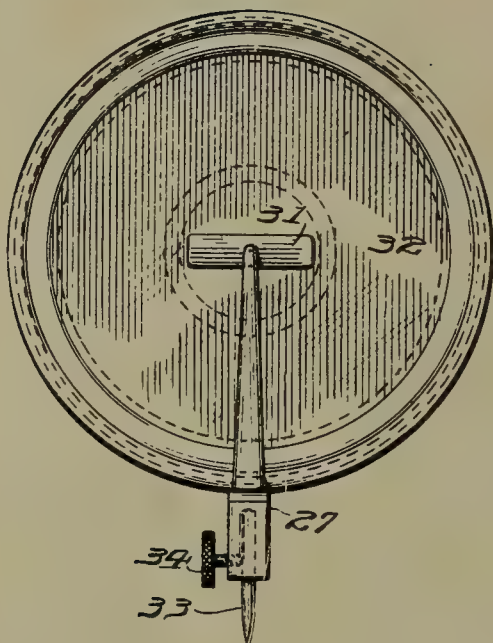


Fig. 5

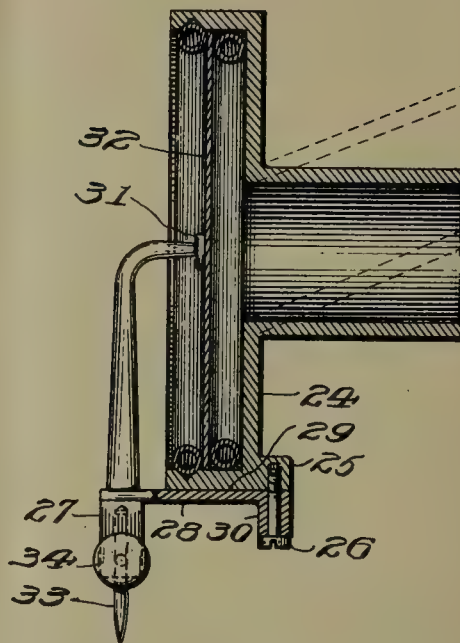


Fig. 1.

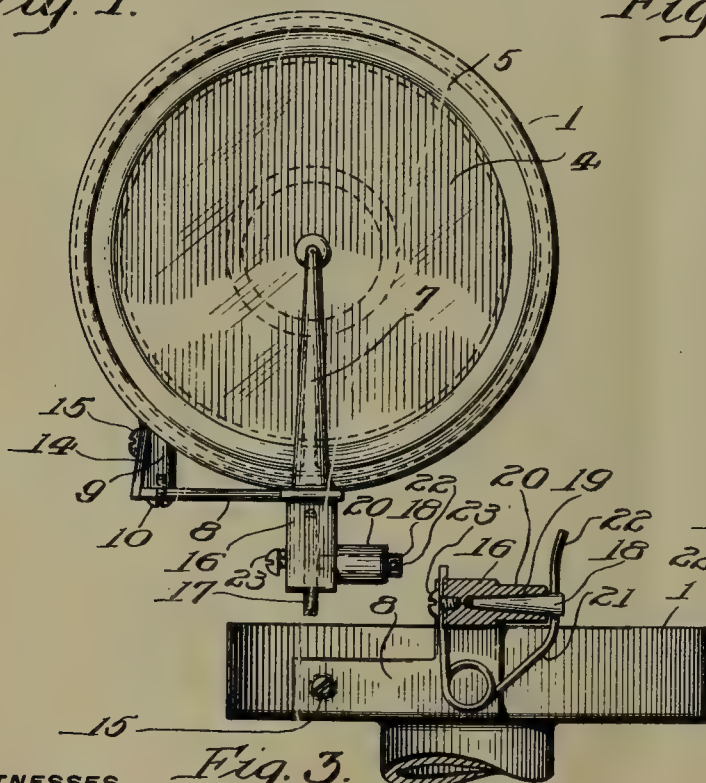


Fig. 2.

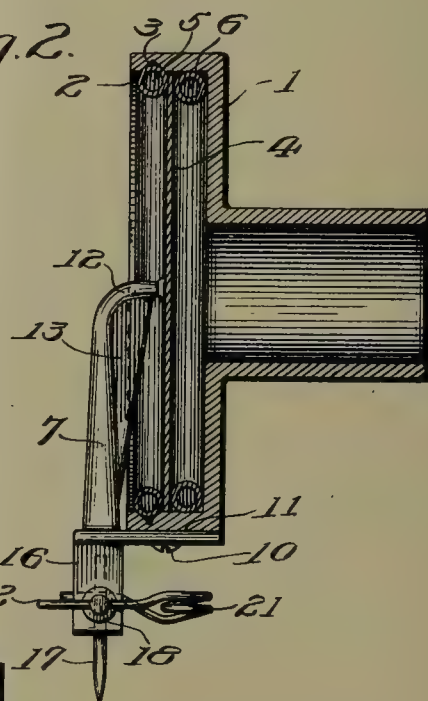


Fig. 3.

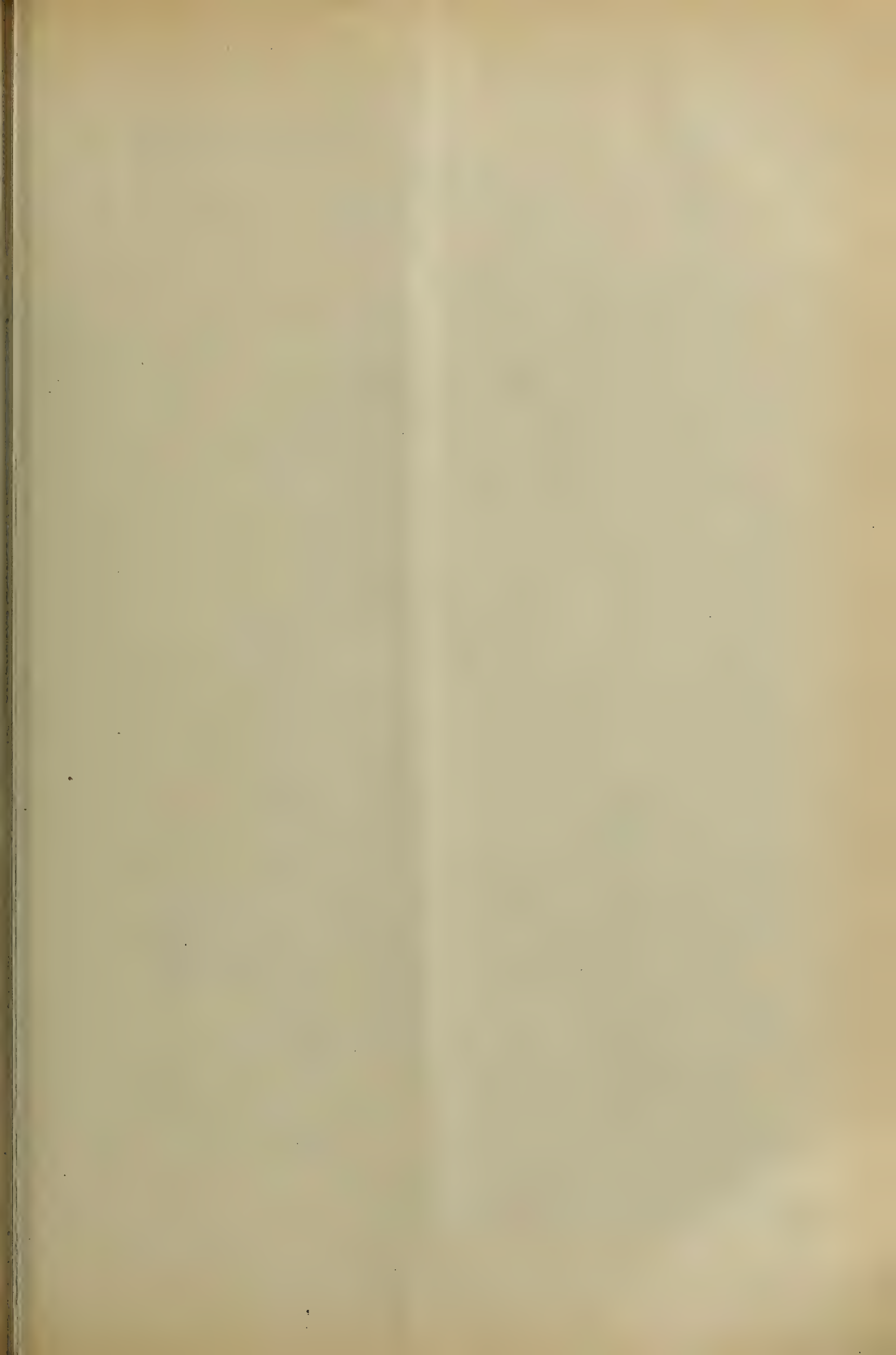
WITNESSES
H. J. Hartman
A. J. Gardner

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INVENTOR
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Wm. C. L.

ATTORNEY



No. 896,008.

PATENTED AUG. 11, 1908.

E. D. GLEASON.

SOUND BOX.

APPLICATION FILED NOV. 14, 1907.

2 SHEETS—SHEET 2.

Fig. 6.

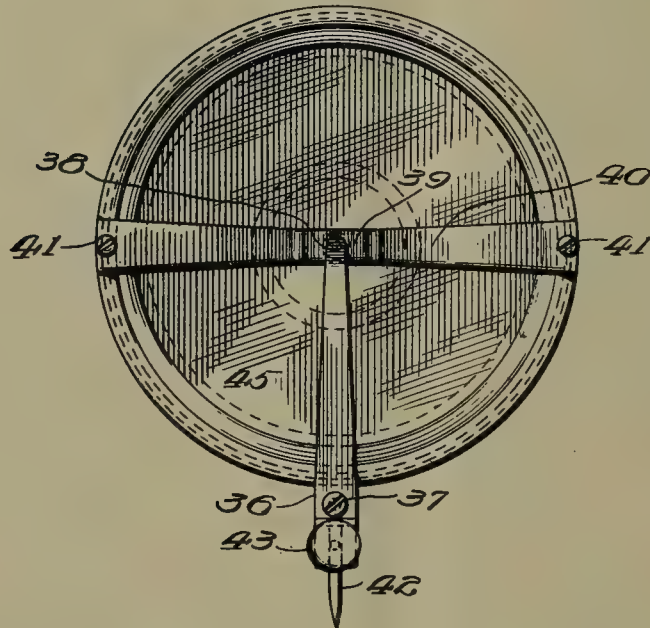
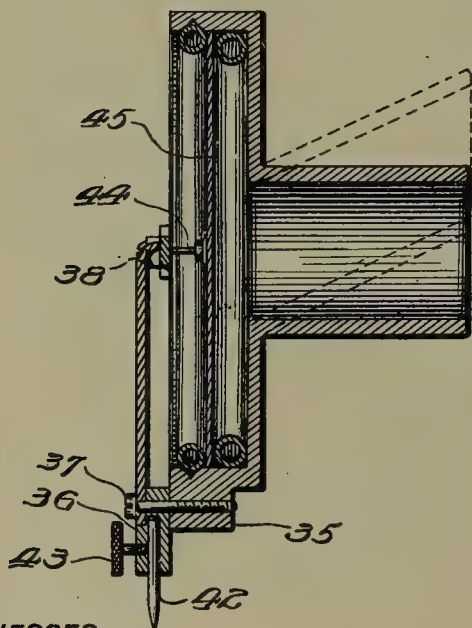
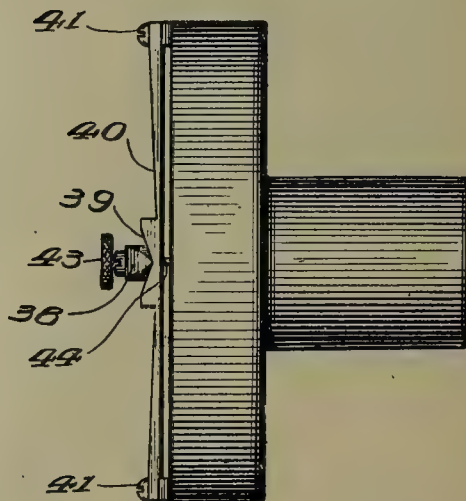


Fig. 7.



WITNESSES
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Fig. 8.



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BY

Home Pats.

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UNITED STATES PATENT OFFICE.

EDWARD D. GLEASON, OF MOORES, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX.

No. 896,008.

Specification of Letters Patent.

Patented Aug. 11, 1908.

Application filed November 14, 1907. Serial No. 402,059.

To all whom it may concern:

Be it known that I, EDWARD D. GLEASON, a citizen of the United States, and a resident of Moores, Delaware county, and State of Pennsylvania, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a full, clear, and complete disclosure.

The main object of this invention is to provide an improved stylus and mounting.

Other objects will appear in the following description:

In the accompanying drawings, Figure 1 is a front elevation of a sound box constructed in accordance with this invention; Fig. 2 a longitudinal section, and Fig. 3 a top plan view of the same partly in section; Figs. 4 and 5 are a front elevation and a longitudinal section respectively of modified forms of this invention; and Figs. 6, 7, and 8 are a front elevation, a longitudinal section and a top plan view respectively of a further modification in the form of this invention.

Referring to the drawings, particularly to Figs. 1, 2 and 3, the device comprises a cylindrical casing 1 having a cylindrical bore 2 provided with a V shaped groove 3 adjacent the front of the casing. The diaphragm 4 is held in place between the gaskets 5 and 6, the outer one 5 of which rests in the said V shaped groove, and the inner one rests in the angle between the bore of the casing and the rear wall thereof. The stylus bar 7 is provided with an arm 8 extending rearwardly and laterally from the bar, the outer end of the arm being pivoted to a downwardly extending lug 9 upon the side of the sound box casing by means of the screw 10 which passes loosely through the arm and is threaded into the lug. The portion of the arm extending rearwardly from the stylus rests slidably against a flattened portion 11 of the casing. The upper end 12 of the stylus bar is turned toward, and phonetically connected as usual to the diaphragm, and a web or brace 13 is arranged upon the inner side of the bar between the upper curved portion and the adjoining vertical portion of the bar, to prevent the bar from yielding to bending stresses.

For the purpose of tensioning the bar to prevent a too free vibration thereof, a plate spring 14 is provided having its inner end rigidly secured by means of the screw 15 to the inner end of the said lug 9 of the sound box casing, the outer end of the spring rest-

ing against the outer end of the swinging arm 8 supporting the stylus bar, whereby the spring acts to slightly resist the vibration of the stylus.

The free end of the stylus bar 16 is provided with the usual socket, and the stylus needle 17 fitting in said socket. For the purpose of holding the needle in position in its socket, a plunger 18 is provided fitting into a socket 19, extending into a boss 20 upon the side of the stylus bar, said socket communicating at its inner end with the socket which holds the stylus needle. The inner end of the plunger 18 is pressed against the upper end of the needle by means of a spiral spring 21, one end of which is connected to the outer end of the plunger, and is extended to form a handle 22, and the other end of which is rigidly connected to the stylus bar by means of a screw 23.

In this form of my invention, it is obvious that the stylus bar is mounted to swing as a whole in a circular path into and out of alignment with an axial plane of the sound box, but for the short distance which the stylus bar moves the direction of motion approaches closely a straight line perpendicular to the diaphragm.

In Figs. 4 and 5 are shown a modification of this invention, in which the sound box casing 24 is provided with a lug 25 on the rear side thereof, through which the stylus bar is pivoted upon an axis at right angles to the axis of the sound box by means of a screw 26, the stylus bar 27 being provided with a rearward extension 28 substantially parallel to the axis of the box, and resting slidably against a flattened portion 29 of the casing, and having at its inner end a hub 30, which is rotatably mounted upon the said screw to form a swinging support for the stylus bar. The inner end of the stylus bar is turned toward the diaphragm as usual, but is not connected to the diaphragm, the inner extremity of the bar being provided with a plate 31, extending laterally upon opposite sides of the bar, the inner surface of the plate being substantially flat and resting against the outer face of the diaphragm 32. The stylus bar is provided with the usual needle 33, held by the set screw 34, but if preferred, a construction similar to that shown in Figs. 1, 2 and 3 may be used to hold the needle in place.

It is obvious that in this modified form of the invention, when the stylus bar is vi-

brated by a sound record, the flattened plate at the upper end of the stylus bar will swing in a circular direction in a plane at right angles to the diaphragm; and the ends of the plate will alternately move toward and away from the diaphragm, causing the diaphragm to vibrate accordingly.

A second modification of this invention is shown in Figs. 6, 7 and 8. In this form the periphery of the sound box casing is provided with an outwardly extending lug 35 to the front face of which is pivoted the stylus bar 36 by means of a screw 37 which passes loosely through the stylus bar, and is threaded into the said lug. The screw for pivoting the bar is substantially perpendicular to the diaphragm, so that the stylus is thus mounted to swing in a plane substantially parallel to the diaphragm. The inner end 38 of the stylus bar is flattened in a direction substantially parallel to the diaphragm and tapered from the pivoted portion of the bar inwardly, and its extremity is pointed and turned towards the diaphragm, but is not connected to the diaphragm as is usually the case, but instead rests within the substantially V shaped groove 39 of a spring cross bar 40, which extends across the front of the sound box, the cross bar being rigidly connected at its ends to the sound box casing by means of screws 41. This spring cross bar is tapered from its outer ends inwardly to points near the center of the bar where the bar is enlarged to form the said V shaped recess for the reception of the inner end of the stylus bar, the cross bar being tapered inwardly so as to make it more yielding at its central portion than near its outer ends. The stylus bar is provided at its outer end with a socket for the reception of the stylus needle 42, which is held in place by the screw 43, but if preferred, a construction similar to that shown in Figs. 1, 2 and 3 may be used instead of the screw 12 to retain the needle.

With this construction in mind, it is obvious that when the stylus bar is oscillated in the usual manner by means of a sound record, the inner end of the bar will slide laterally over the wedge like faces forming the V shaped groove of the cross bar, and cause the cross bar to vibrate laterally. By means of the rod 44 which is connected at one end to the cross bar, and at its other end to the diaphragm 45 the lateral motion of the cross bar is transmitted to the diaphragm to reproduce the sound waves corresponding to the movements of the stylus bar.

The two sound boxes shown in Figs. 4 to 8 are intended to be carried upon the end of a swinging arm, which will give the stylus needle a suitable inclination to the record. For this purpose an arm having an end turned obliquely away from the record may be used or the arm may be straight, and the tubular connecting portion of the sound box may be

formed at an oblique angle to the casing as indicated by the dotted lines in Figs. 5 and 7 respectively.

Although I have shown only a few of the forms in which this invention may be embodied, it is obvious that other forms might be devised, and various changes in the details of the construction of the various forms might be made within the scope of the appended claims, without departing from the spirit of this invention or sacrificing any of the advantages thereof.

Having thus fully described my invention, what I claim and desire to protect by Letters Patent of the United States is:

1. In a sound box, the combination with a casing, of a stylus bar mounted to swing upon an axis parallel to itself into and out of longitudinal alinement with an axial plane of said casing.
2. In a sound box, a stylus bar mounted to oscillate on an axis parallel to the longitudinal axis of said bar.
3. In a sound box, the combination with a diaphragm, of a stylus bar mounted to oscillate into and out of longitudinal alinement with an axial plane of said sound box on an axis parallel to said diaphragm.
4. In a sound box, the combination with a diaphragm, of a stylus bar mounted to oscillate upon an axis parallel to its longitudinal axis and to said diaphragm.
5. In a sound box, the combination with a casing, of a stylus bar, and a support for said bar yieldingly mounted and normally free to slide against said casing in a plane extending at an angle to the bar.
6. In a sound box, the combination with a casing, of a diaphragm, a stylus bar, and a support for said bar yieldingly mounted and normally free to slide against said casing in a plane transverse to the bar and substantially perpendicular to the diaphragm.
7. In a sound box, a stylus bar having a socket, a stylus needle in said socket, a second socket transverse to said first mentioned socket communicating therewith, a plunger in said second socket projecting into said first mentioned socket, and a spring to press said plunger inwardly to hold said needle in place, one end of said spring being connected to said plunger and extending therefrom to form a handle.
8. In a sound box, the combination with a stylus bar having a stylus socket and a plunger socket arranged transversely of said stylus socket and in communication therewith, the axes of the two sockets being in the same plane, of a plunger engaging in said plunger socket and a spring to hold said plunger in place to retain a stylus in said stylus socket, one end of said spring being connected to said plunger and extended to form a handle.
9. In a sound box the combination with a

stylus bar having a stylus socket and a plunger socket arranged transversely of said stylus socket of a plunger in said plunger socket and a spring fixed at one end and secured adjacent its other end to said plunger, the latter end of said spring projecting beyond said plunger to form a handle therefor.

10. In a sound box, the combination with a diaphragm of a stylus bar having a stylus socket and mounted to oscillate upon an axis parallel to the axis of said socket and substantially in the plane of said diaphragm.

11. In a sound box, the combination with a diaphragm of a stylus bar having a stylus socket and mounted to oscillate upon an axis parallel to the axis of said socket to swing the axis of said socket into and out of longitudinal alinement with an axial plane of the sound box.

12. In a sound box the combination with a diaphragm of a stylus bar having a stylus socket and mounted to oscillate upon an axis parallel to the socket and parallel to the plane of the diaphragm to bring the axis of said socket into and out of longitudinal alinement with an axial plane of the sound box.

13. In a sound box the combination with a casing, of a diaphragm, a stylus bar, phonetically connected to said diaphragm at one end and having a stylus socket at its free end, an arm connected to said bar and extending laterally therefrom, and a pivot parallel to said socket and substantially in the plane of the diaphragm, connecting said arm to said sound box casing.

14. In a sound box the combination with a casing, of a diaphragm, a stylus bar phonetically connected to said diaphragm at one end and having a stylus socket at its free end, an arm connected to said bar and extending laterally therefrom, and a pivot parallel to said socket and in the plane of said diaphragm, connecting said arm to said sound box casing.

15. In a sound box, the combination with a casing of a diaphragm, a stylus bar, an arm secured to said bar and extending rearwardly and laterally therefrom, and a pivot substantially in longitudinal alinement with the plane of the diaphragm, connecting said arm to said casing.

16. In a sound box the combination with a casing of a diaphragm, a stylus bar, an arm secured to said bar and extending rearwardly and laterally therefrom, and a pivot substantially in longitudinal alinement with the plane of the diaphragm, connecting said arm to said casing, the portion of said arm extending rearwardly from the stylus bar being in sliding contact with said sound box casing.

17. In a sound box, the combination with a casing of a diaphragm, a stylus bar, an arm secured to said bar and extending rearwardly

and laterally therefrom, a pivot substantially in longitudinal alinement with the plane of the diaphragm, connecting said arm to said casing, and a spring to yieldingly restrain the vibration of said stylus.

18. In a sound box, the combination with a casing of a diaphragm, a stylus bar, an arm secured to said bar and extending rearwardly and laterally therefrom, and a pivot substantially in longitudinal alinement with the plane of the diaphragm, connecting said arm to said casing, and a spring engaging against the end of said arm to yieldingly restrain the vibration of said stylus.

19. In a sound box, the combination with a casing of a diaphragm, a stylus bar, an arm secured to said bar and extending rearwardly and laterally therefrom, a lug upon said casing, a pivot connecting said arm and said lug, and a spring secured to said lug and engaging the end of said arm.

20. In a sound box, the combination with a casing of a diaphragm, a stylus bar, an arm secured to said bar and extending rearwardly and laterally therefrom, a lug upon said casing, a pivot connecting said arm and said lug and a flat spring secured to said lug and engaging the end of said arm, the portion of said arm extending rearwardly being in sliding contact with said casing and said pivot being substantially in the plane of said diaphragm and parallel to said stylus bar.

21. In a sound box, the combination with a casing, of a stylus bar, and a transverse arm rigid at one end with said bar, and in sliding contact with said casing and pivoted to said casing at its opposite end.

22. In a sound box the combination with a casing, of a stylus bar, a transverse arm rigid at one end with said bar, and in sliding contact with said casing, and pivoted to said casing at its opposite end, and yielding means to restrain the oscillation of said stylus bar.

23. In a sound box the combination with a casing, of a stylus bar, a transverse arm rigid at one end with said bar, and in sliding contact with said casing and pivoted to said casing at its opposite end, and a spring fixed to said casing and engaging the end of said bar to restrain the oscillation of said bar.

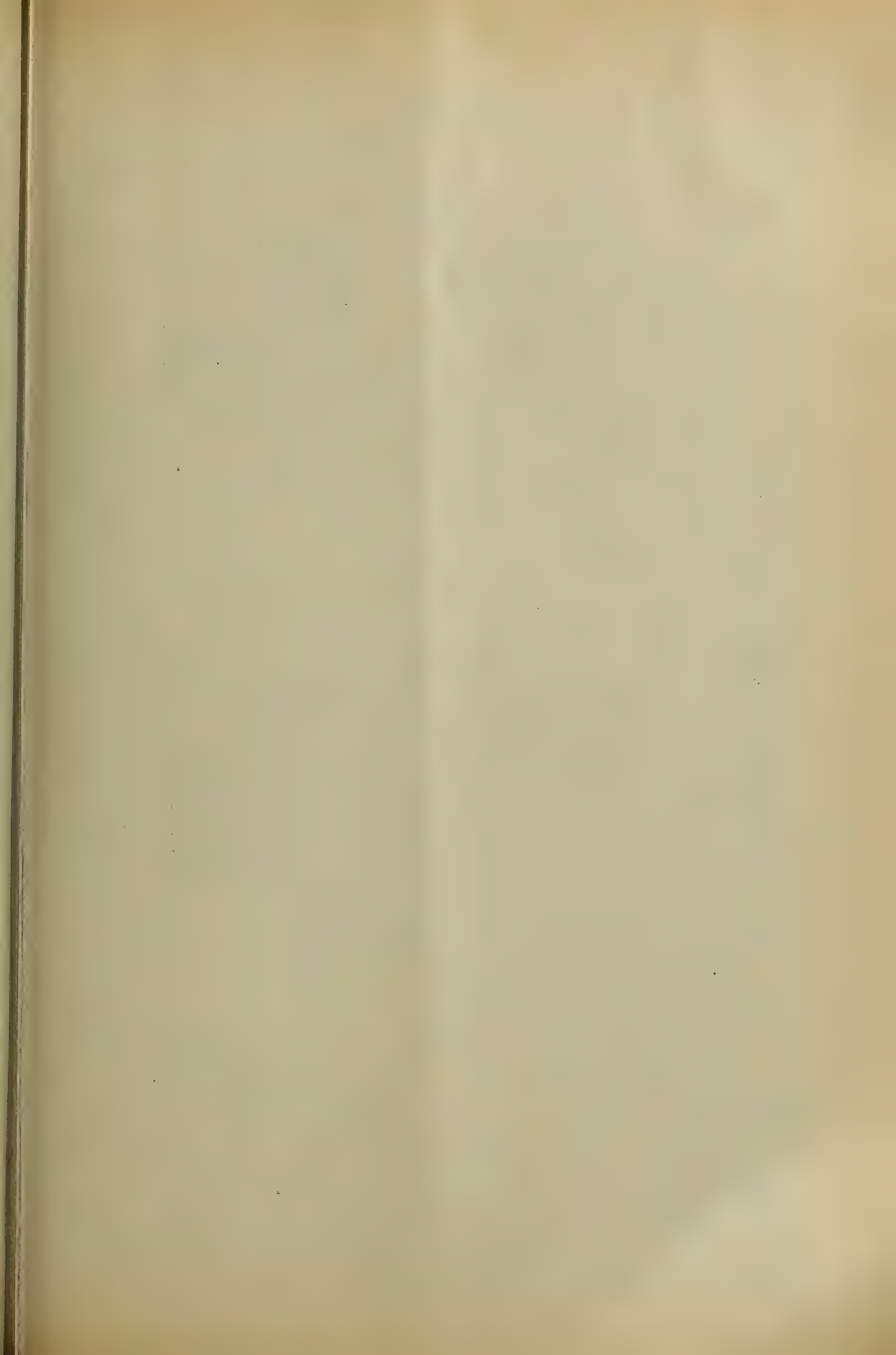
24. In a sound box, the combination with a casing, of a diaphragm, a stylus bar provided with a stylus socket, and a support for said bar yieldingly mounted and normally free to slide against said casing in a plane extending substantially perpendicular to the longitudinal axis of said socket and to said diaphragm.

In witness whereof I hereunto set my hand this 13th day of November, A. D. 1907.

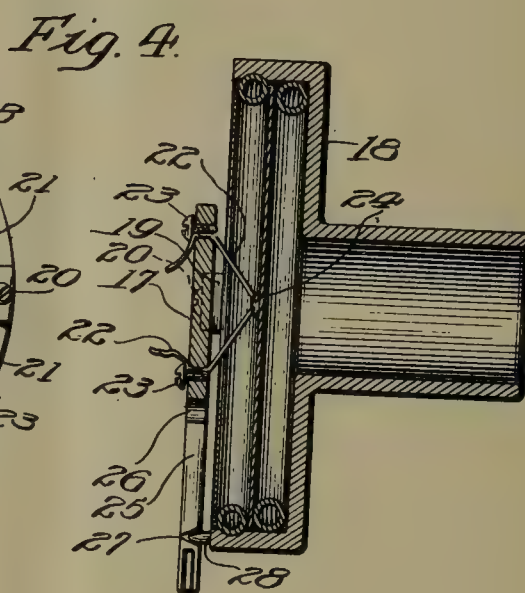
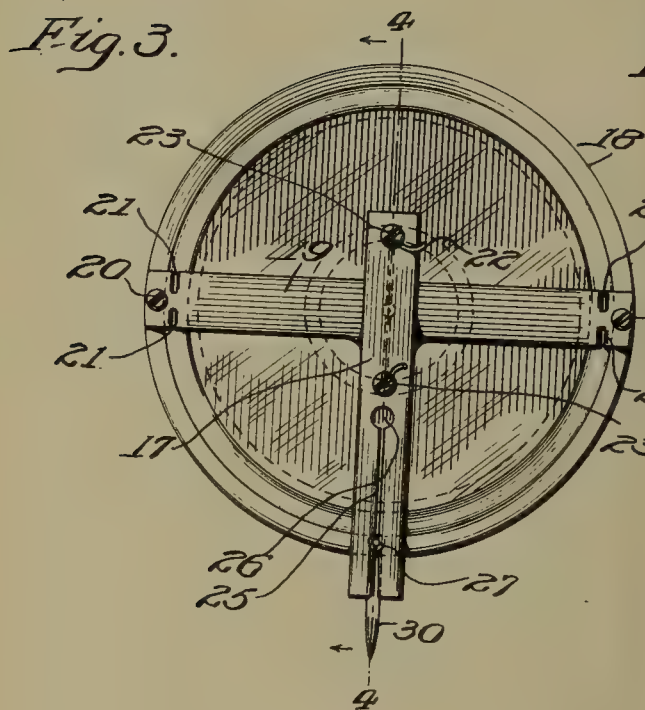
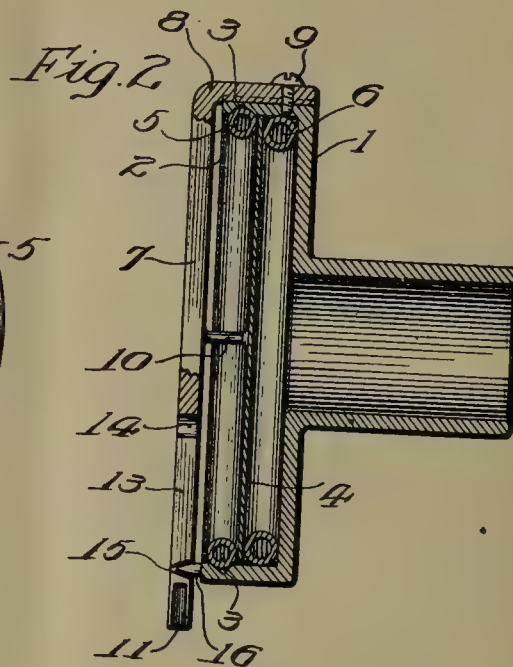
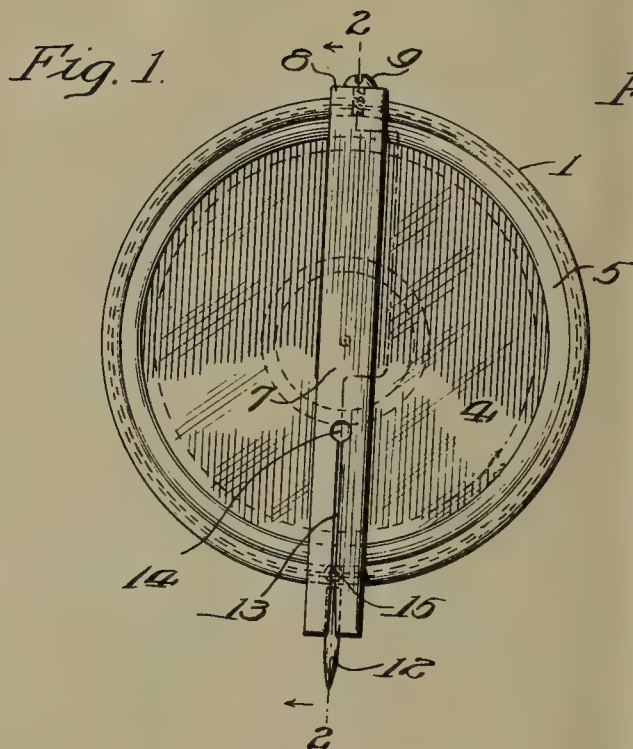
EDWARD D. GLEASON.

Witnesses:

A. I. GARDNER,
ALEXANDER PARK.



E. D. GLEASON.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED NOV. 14, 1907.



WITNESSES
H. J. Hartman.
A. J. Gardner.

BY

INVENTOR
Edward D. Gleason.
Wm. C. Kelly.

ATTORNEY

UNITED STATES PATENT OFFICE.

EDWARD D. GLEASON, OF MOORES, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX FOR TALKING-MACHINES.

No. 896,009.

Specification of Letters Patent.

Patented Aug. 11, 1908.

Application filed November 14, 1907. Serial No. 402,060.

To all whom it may concern:

Be it known that I, EDWARD D. GLEASON, a citizen of the United States, and a resident of Moores, Delaware county, Pennsylvania, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a full, clear, and complete disclosure.

The main objects of this invention are to provide in a sound box an improved stylus bar and mounting, and an improved means of connecting the stylus bar to the diaphragm.

Other objects of this invention will appear in the following description.

In the accompanying drawings: Figure 1 is a front elevation of a sound box constructed in accordance with this invention; Fig. 2 a longitudinal section of the same upon the line 2—2 of Fig. 1, looking in the direction of the arrows; Fig. 3 a front elevation of a modified form of this invention; and Fig. 4 a longitudinal section upon line 4—4 of Fig. 3, looking in the direction of the arrows.

Referring to Figs. 1 and 2 of the drawings, one embodiment of this invention comprises a sound box casing 1, having a cylindrical bore 2 in the face thereof and an annular V-shaped groove 3 within the bore near the front edge of the box. The diaphragm 4 is carried within the bore of the box between hollow annular gaskets 5 and 6, the outer gasket 5 resting in the said V-shaped groove 3 and the inner gasket 6 being retained between the cylindrical bore of the box and the rear wall thereof, the outer gasket being necessarily of greater diameter than the inner gasket whereby the two gaskets bear against the diaphragm in concentric circles.

The stylus bar 7 consists of a straight, flat rectangular main portion spaced from the front of the box and terminating in a portion 8 extending at substantially right angles to the main portion and longitudinally over the outer surface of the sound box casing, being rigidly secured within a corresponding recess in the outer periphery of the sound box casing by means of the screw 9. Between the diaphragm and main portion of the stylus bar and axially of the sound box is arranged a rod 10, which is rigidly connected to the bar and the inner end of which is phonetically connected to the diaphragm.

The lower end of the stylus bar projects outside of the periphery of the sound box

and is provided with the socket 11 for the reception of the stylus needle 12, and in order to hold the needle in place, the bar is split longitudinally with a kerf 13 which terminates at its upper end in a circular aperture 14 extending transversely through the bar. The bar is also provided adjacent the upper end of the needle socket with a conical aperture 15 extending transversely through the bar and in alinement with the sound box casing. A conical pin 16 is secured to the sound box casing and converges within the said aperture 15, being normally slightly out of contact with the sides of the conical aperture and the upper end of the stylus needle when the stylus needle is in operative position but when the stylus bar is pressed toward the sound box casing, the conical pin engages against the sides of the conical aperture and the end of the stylus needle to spread the sides of the stylus socket and to eject the stylus needle, the ordinary oscillation of the stylus bar in the form of vibrations corresponding to sound waves, not being sufficient to bring the end of the needle into contact with the sides of the conical aperture, a special pressure being required for this purpose.

With this construction in mind, it is obvious that the stylus bar is mounted to oscillate from its upper end as an axis in a plane perpendicular to the diaphragm for the purpose of either recording or reproducing sound waves.

In Figs. 3 and 4 showing a modified form of this invention the stylus bar 17 is similar in shape to that already described but instead of extending across the full front of the sound box casing 18 and being fastened in alinement with the stylus needle, its inner end terminates at a point between the center of the sound box and the edge thereof and is carried upon lateral extensions constituting a cross bar 19, extending diametrically over the front of the box and being rigidly secured at its ends to the sound box casing by means of the screws 20. The ends of the cross bar are weakened by oppositely disposed lateral kerfs 21 arranged just within and in close proximity to the inner edges of the sound box casing whereby the cross bar is made sensitive to the torsional stresses such as would result from the necessary oscillation of the stylus bar corresponding to the sound waves, but remaining substantially rigid with respect to stresses tending to bend the same.

The stylus bar is connected to the diaphragm from two points spaced at respectively equal distances above and below the axial line of the sound box by means of a thread or wire 22 the ends of which are passed through suitable apertures in the stylus bar and terminate and are held in place beneath the heads of screws 23 which are arranged adjacent to the said apertures the central portion of the thread being phonetically connected by wax 24 or other suitable means to the center of the diaphragm. I preferably use a thread of non metallic material for this purpose, the object being to avoid the harsh unpleasant vibrations which are caused when a metallic connection is used between the diaphragm and the stylus.

The lower end of the stylus bar projects freely over the face of the sound box and projects outside of the periphery thereof, in a manner similar to that already described for the stylus shown in Figs. 1 and 2. The lower portion of this bar 17 is identical in form with that already described for the previous figures, the bar being split longitudinally by a kerf 25 terminating at its upper end in a circular aperture 26 and having a conical aperture 27 to receive the conical pin 28 which is rigid with a sound box casing, the lower surface of the conical pin being normally just out of contact with the sides of the conical aperture and the upper end of the stylus needle 29, when the needle is in its operative position in its socket.

In the operation of this latter form of sound box, it is evident that the portion of the stylus bar in alinement with the stylus needle will vibrate in a plane perpendicular to the diaphragm and about its lateral extensions as an axis, bringing stresses alternately upon the upper and lower ends of the thread connecting the stylus bar to the diaphragm and producing corresponding vibrations of the diaphragm.

Although I have shown and described only two forms in which this invention may be embodied, yet I do not limit myself to these particular forms as it is evident that various changes might be made in the details of construction within the scope of the appended claims without departing from the spirit of this invention.

Having thus fully described my invention, what I claim and desire to protect by Letters Patent of the United States is:—

1. In a sound box, the combination with a casing of a diaphragm, a stylus bar mounted to oscillate with respect to said casing, and means connecting a point in said diaphragm with points in said stylus bar upon opposite sides of the axis of oscillation of said stylus bar.

2. In a sound box, the combination of a casing with a diaphragm, a stylus bar having a portion extended upon opposite sides of the

longitudinal axis of said casing mounted to oscillate with respect thereto and means connecting points of said bar upon opposite sides of the longitudinal axis of said casing to the central point of said diaphragm.

3. In a sound box, the combination of a casing with a diaphragm, a stylus bar having a portion extended upon opposite sides of the longitudinal axis of said casing mounted to oscillate with respect thereto and non-metallic thread connecting points of said bar upon opposite sides of the longitudinal axis of said casing to the central point of said diaphragm.

4. In a sound box, the combination with a casing of a stylus bar, a stylus needle carried by said bar, and means actuated by the movement of said bar with respect to said casing for ejecting said needle therefrom.

5. In a sound box, a stylus bar having a socket in the end thereof for the reception of a stylus needle, said bar being split longitudinally through the sides of said socket whereby a needle may be yieldingly held in said socket, and means acting laterally of the bar for spreading the sides of said socket to release a needle.

6. In a sound box, the combination with a casing of a stylus bar having a socket in the end thereof to hold a stylus needle, said bar being split longitudinally through the sides of said socket and having a transverse aperture adjacent the upper end of said socket, and a conical pin secured to said casing and projecting into said aperture to eject the needle when the stylus is pressed toward said casing.

7. In a sound box, the combination with a casing of a stylus bar and a mounting for said bar comprising a transverse bar extending diametrically of said casing and forming the axis of oscillation of said stylus bar, the opposite ends of said transverse bar being rigidly secured to said casing.

8. In a sound box, the combination with a casing of a stylus bar and a mounting for said bar comprising a transverse bar extending diametrically of said casing, the opposite ends of said transverse bar being rigidly secured to said casing and said transverse bar being weakened at a point adjacent its end, causing said bar to yield readily to torsional stresses, but to remain substantially rigid with respect to stresses tending to bend the same.

9. In a sound box, the combination with a casing, of a stylus bar having means for holding a needle, and means carried by said casing and rigid therewith for ejecting a needle from said bar.

10. In a sound box, the combination with a casing, of a diaphragm, a cross bar extending diametrically of the casing and secured to the opposite sides thereof, a stylus bar secured to said cross bar and projecting transversely upon each side thereof, and means

connecting said stylus bar upon opposite sides of said cross bar to said diaphragm, said cross bar forming the axis of oscillation of said stylus bar.

5 11. In a sound box, the combination with a casing, of a stylus bar having means for holding a needle, and a pin carried by said casing and rigid therewith for ejecting a needle from said bar.

10 12. In a sound box, the combination with a casing, of a stylus bar having means for holding a stylus, and means actuated by the movement of said bar with respect to said casing for ejecting a needle from said bar.

15 13. In a sound box, the combination with a diaphragm, of a stylus bar mounted to oscillate upon a fixed axis lying in a plane perpendicular to said diaphragm and extending centrally thereof.

20 14. In a sound box the combination with a diaphragm, of a stylus bar mounted to oscillate upon an axis lying in a plane perpendicular to said diaphragm and extending centrally thereof, and means connecting said
25 bar upon opposite sides of the axis of oscillation thereof to said diaphragm.

15. The combination with a diaphragm, of a stylus bar mounted to oscillate with respect thereto, and means connecting said bar
30 upon opposite sides of its axis of oscillation to said diaphragm.

16. The combination with a diaphragm, of a stylus bar mounted to oscillate with respect thereto, and means connecting said
35 bar upon opposite sides of its axis of oscillation to the central portion of said diaphragm.

17. In a sound box, the combination with a diaphragm, of a stylus bar mounted to oscillate upon a fixed axis parallel to said diaphragm in a plane perpendicular thereto and
40 extending diametrically thereof.

18. In a sound box, the combination with a casing, of a diaphragm, a stylus bar mounted upon said casing to oscillate upon an axis
45 parallel to said diaphragm and in a plane perpendicular thereto extending diametrically thereof.

19. In a sound box, the combination with a casing, of a stylus bar having a split socket
50 for holding a stylus needle, means actuated

by the movement of said bar with respect to said casing for spreading the sides of the socket to release the needle.

20. In a sound box, the combination with a casing, of a stylus bar having a split socket 55 for holding a stylus needle, a tapering pin carried by said casing and extending transversely of said socket for spreading the sides of the socket to release the needle.

21. In a sound box, the combination with 60 a casing, of a stylus bar having a socket to hold a stylus needle, and a transverse aperture communicating with the socket, of a pin carried by said casing and engaging in said transverse aperture to eject a needle from 65 said socket.

22. In a sound box, the combination with a casing, of a stylus bar having means for holding a stylus needle, and means carried by said casing and acting laterally of said bar to 70 eject a needle therefrom.

23. In a sound box, a stylus bar having a socket in the end thereof for the reception of a stylus needle, said bar being split longitudinally through the sides of said socket, and 75 means carried by the sound box and acting transversely of said socket for spreading the sides of said socket to release a needle therefrom.

24. The combination with a stylus bar 80 mounted to oscillate, of means fixed with respect to the axis of oscillation of said bar for ejecting a needle therefrom.

25. The combination with a stylus bar mounted to oscillate and having a split 85 socket, of means fixed with respect to the axis of oscillation of said bar for spreading the sides of said socket to eject a needle therefrom.

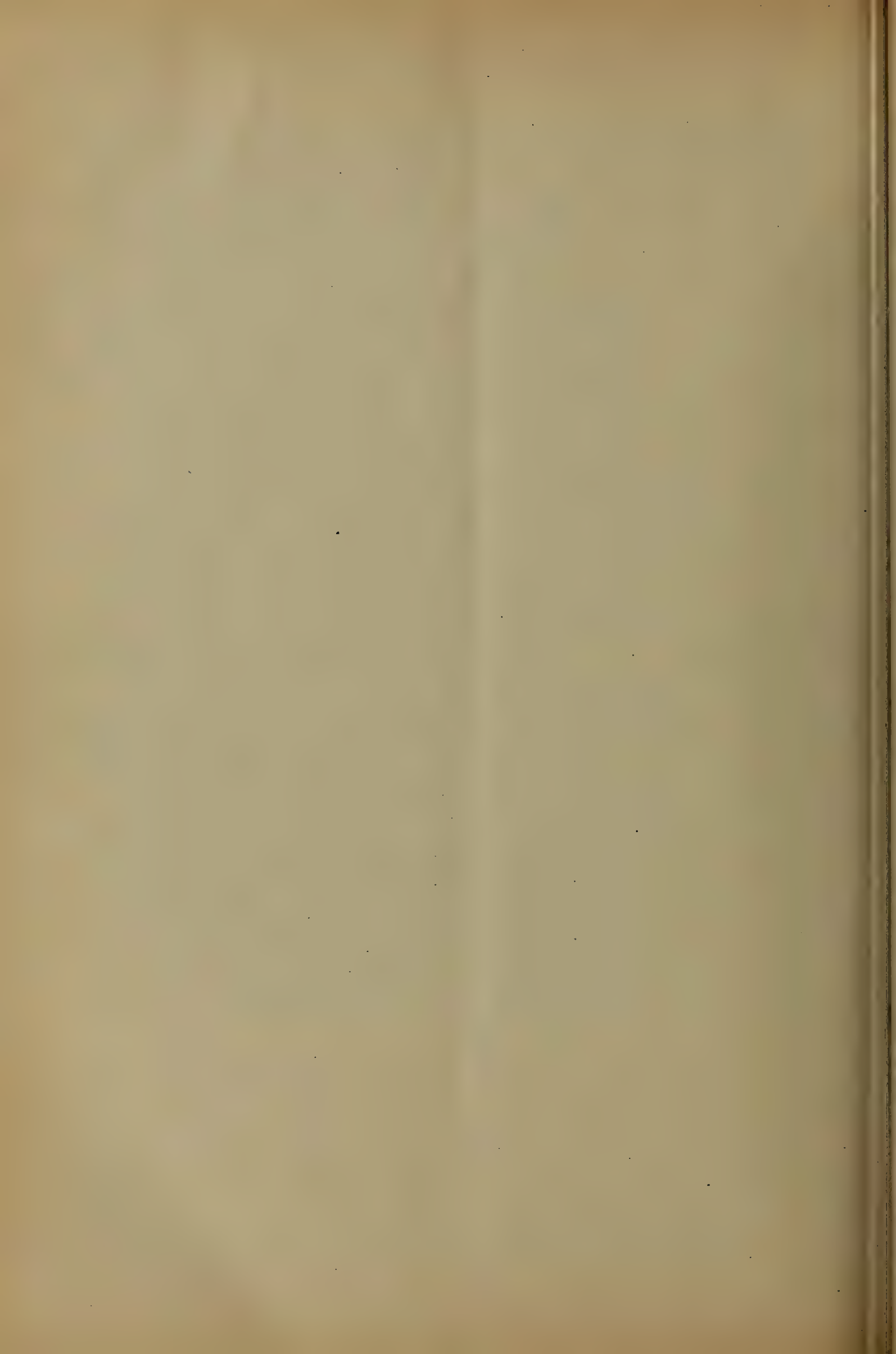
26. The combination with a stylus bar 90 having a split socket, of means acting laterally of said bar and actuated by the movement of the said bar for spreading the sides of said socket to eject a needle therefrom.

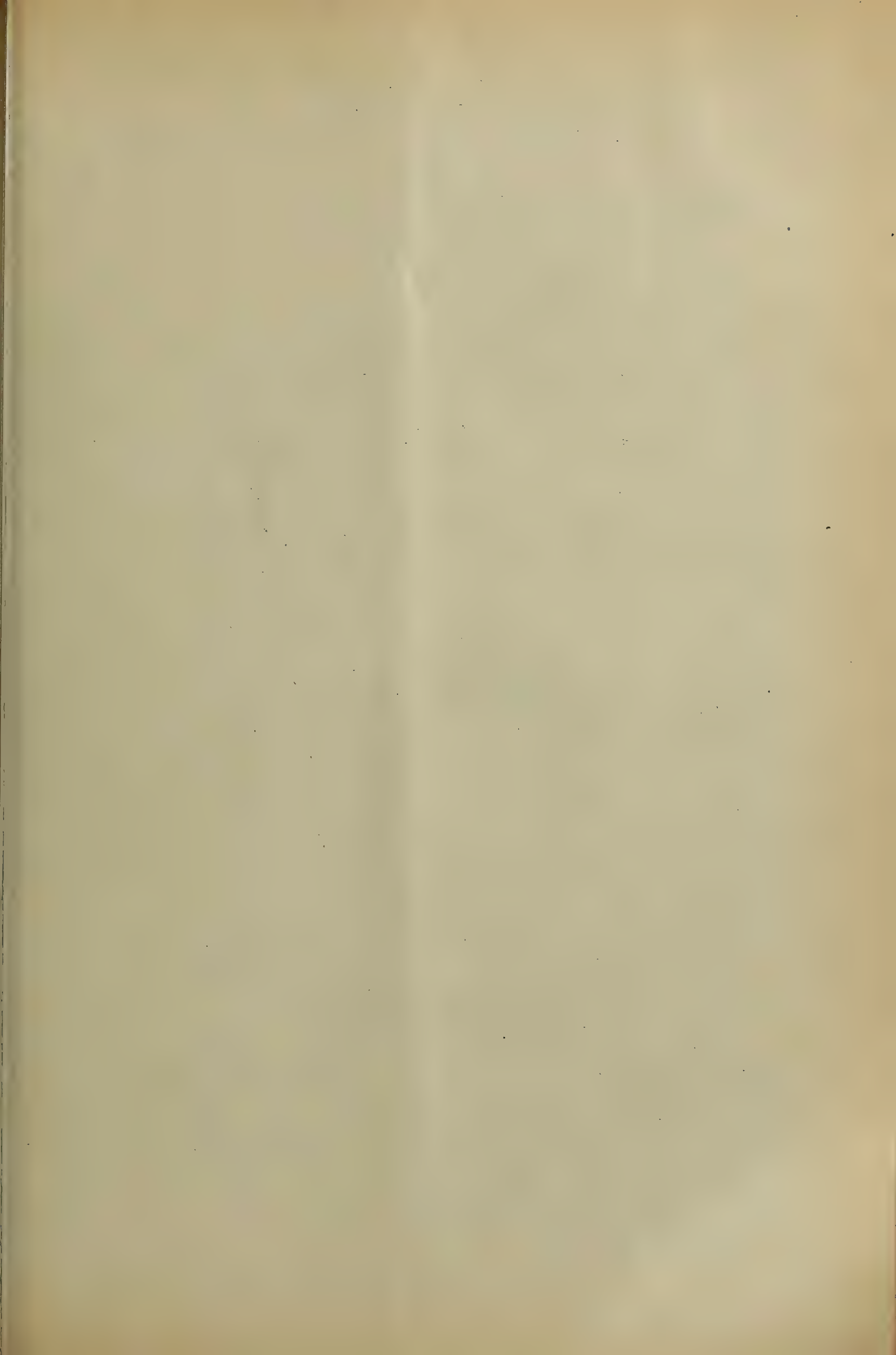
In witness whereof I hereunto set my hand 95 this 13th day of November, A. D. 1907.

EDWARD D. GLEASON.

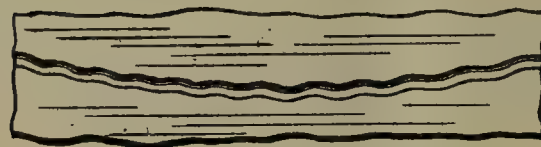
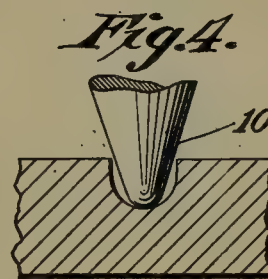
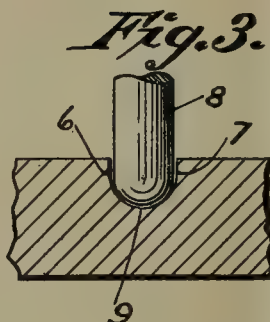
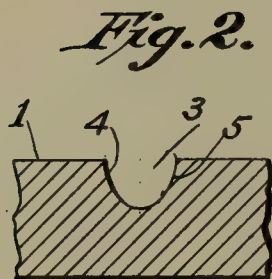
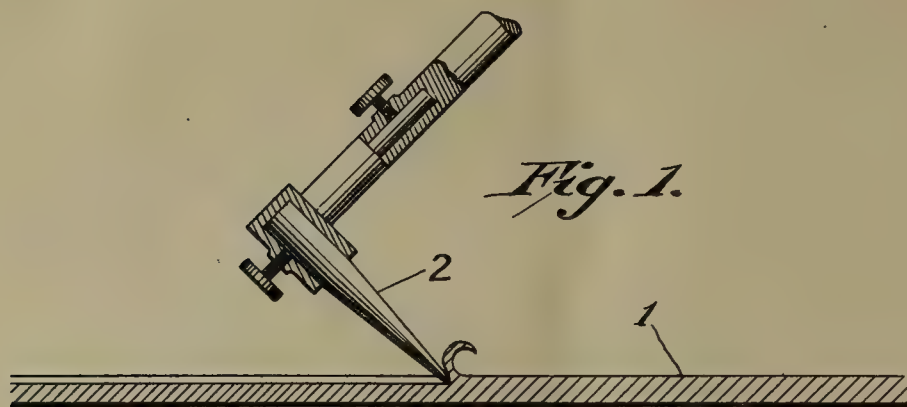
Witnesses:

A. I. GARDNER,
ALEXANDER PARK.





E. R. JOHNSON.
 RECORD FOR TALKING MACHINES.
 APPLICATION FILED NOV. 12, 1904.



WITNESSES:

Robt. P. Mitchell
 Edw. W. Vaill Jr.

INVENTOR
 Eldridge R. Johnson.
 BY
 10me. [Signature]
 ATTORNEY.

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF MERION, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

RECORD FOR TALKING-MACHINES.

No. 896,059.

Specification of Letters Patent.

Patented Aug. 11, 1908.

Original application filed August 16, 1898, Serial No. 688,695. Divided and this application filed November 12, 1904. Serial No. 232,389.

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of Merion, county of Montgomery, State of Pennsylvania, have invented certain new and useful Improvements in Records for Talking-Machines, of which the following is a full, clear, and exact disclosure, the subject-matter of this invention having been originally set forth in my previous application, No. 688,695, filed August 16, 1898, of which this application is a division.

My invention relates to improvements in sound records of either the cylindrical or disk type, and has for its object to provide an improved record such that the walls of the grooves shall be so formed as to reproduce the sounds of the record in tones more clear and distinct than has heretofore been possible from records of prior construction.

In forming records upon sound recording machines for use in talking machines, such as the gramophone, where the sound waves are recorded in the form of a groove of even depth having lateral undulations as distinguished from an undulatory groove of varying depth, as in the type of machines of which the phonograph is an illustration, it is essential, in order to produce a clear record, that the material be neatly and cleanly cut from the grooves in the process of recording so that smooth, well-defined, surfaces be formed in the walls of a well defined groove.

In the art of making sound records, comparatively little attention has been paid to the finishing and the forming of the surfaces of the walls of the record groove. The vertical groove has heretofore been cut by a recording tool, which, owing to the character of the groove and the shape of the tool, has not only had a tendency to tear the material of the record, or distort the same, so as to form roughnesses which, in the reproduction of the record or its duplicate, cause disagreeable sounds, owing to the harsh vibrations of the diaphragm caused thereby, but also, among other things, in the vertical type of record, the resistance on the cutting stylus in gouging out the material increases in proportion to the depth, which objection is overcome in my cut laterally undulating record groove, where the resistance to the force exerted by the cutting stylus is uniform and even.

I have discovered by careful experiments

that the best results are obtained in a cut out laterally undulatory groove of substantially constant depth in a record tablet, preferably of wax or other suitable material, and furthermore, when the walls of the groove diverge from the bottom of the same to the surface of the record, or, more specifically, when the walls of the groove are formed by surfaces which in cross section give the lines of a segment of an ellipse, the groove being widest at its mouth, and gradually diminishing in its width toward the bottom. By this construction, the material is neatly and accurately cut out, and forms a groove having smooth and well defined walls; the recording needle has greater freedom of oscillation, and by reason of the relative contour of the walls of the groove with the outline of the needle, this construction prevents any binding effect and secures a maximum ease of movement of the needle with a minimum of wear upon the record.

I herein describe particularly my preferred form of cut groove substantially in the shape of the segment of an ellipse, though it will be understood that I do not limit myself to that particular form of groove, and it is unnecessary to further illustrate or describe my broad invention.

For a full, clear, and exact description of this form of my invention, reference may be had to the following specification, and to the accompanying drawing forming a part thereof, in which

Figure 1 is a sectional view of a record showing a recording tool in operation in connection therewith, parts of said recording tool being shown in section; Fig. 2 is a large cross sectional view of the record showing the shape of the groove as formed therein; Fig. 3 is a sectional view showing a form of groove having perpendicular walls in connection with a needle with an outline substantially like that of the end of the record groove; Fig. 4 shows a groove of substantially the same character as that shown in Fig. 3, with the stylus point of the ordinary construction in place therein; Fig. 5 is a plan view of the record disk showing the grooves spirally arranged in the surface thereof; Fig. 6 illustrates a part of the record showing a single record groove greatly magnified and disclosing the undulatory form of the sound waves.

Referring to the drawings, the numeral 1

indicates the record plate which is used in the gramophone or talking machine having a groove 3 formed therein and having walls of elliptical shape in cross section, as indicated at 4 and 5. This groove as shown in Fig. 2 is widest at its mouth and is formed by a cutting tool 2 having its cutting edges formed by scarfing at an angle to its axis the end of a substantially conical tool, with the result that the cutting edges of the tool are substantially elliptical, but when I use the words ellipse and elliptical, I mean having the contour which would result from the intersection of a plane with a side of a body, which is substantially conical, at an angle to the axis of the said body. Figs. 3 and 4 show a groove having perpendicular walls 6 and 7 and a substantially arc-shape bottom. In Fig. 3 a blunt cylindrical stylus or needle 8, having its end substantially in the shape of a hemisphere, is shown in position in said groove, and in Fig. 4 the stylus pin 10 is conical in shape, and is that in general use in connection with disk talking machines.

It is clear in both of the previously mentioned constructions illustrated in Figs. 3 and 4, that the stylus bar oscillating in the direction transverse to the length of the groove, will be prevented from having that free and untrammelled movement which is incident to the construction shown in Fig. 2 owing to the fact that in one case the stylus is closely confined between the vertical walls of the groove, and in the other case the walls of the groove at its mouth are liable to be quickly worn and injured owing to the slight contact of the stylus with the record at the mouth of the groove. In contradistinction to this action of the stylus bar and stylus, my improved groove shown in Fig. 2 imparts a free positive movement to the stylus and substantially the whole surface of the groove may be in contact with the end of the stylus without causing the same to bind or become wedged in said groove. The oscillating effect given to the point of the stylus, while in position in the groove as it traverses the undulations thereof, is best understood by reference to the enlarged groove shown in Fig. 6.

It is understood that in reproducing, the record thus formed may be used for reproducing purposes directly, or a more durable and indestructible record may be reproduced by various processes from the original record.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States, is:—

1. A sound record having a laterally undulatory groove of substantially constant depth made by a tool having edges so sharpened and inclined as to cut the material as distinguished from tracing or marking said material.

2. A disk sound record, having a cut laterally undulatory groove of substantially

constant depth, the walls of said groove diverging from the bottom of the same to the surface of the record.

3. The method of producing sound records consisting in cutting as distinguished from marking or tracing upon a tablet of suitable material by means of the lateral vibrations of a suitable stylus a record groove of appreciable and substantially uniform depth having lateral undulations corresponding to the sound waves.

4. A sound record made from a cut laterally undulatory groove of substantially constant depth, the walls of said groove diverging from the bottom of the same to the surface of the record tablet.

5. A sound record tablet having a laterally undulatory groove of substantially constant depth made by a tool having edges so sharpened and inclined as to cut out the material to form the groove as distinguished from tracing or marking the said material.

6. A disk sound record having a laterally undulatory groove of substantially constant depth in which the record groove was formed by cutting out and removing the material in forming the record groove, the walls of the said groove diverging from the bottom of the same to the surface of the record tablet.

7. A sound record made from a cut out laterally undulatory groove of substantially constant depth, the walls of the said groove diverging from the bottom of the same to the surface of the record tablet.

8. A disk sound record comprising a spirally disposed laterally undulatory groove of substantially constant depth in which the record groove was formed by cutting out and removing the material in forming the record groove, substantially as described.

9. A sound record having a cut out laterally undulatory groove of substantially constant depth.

10. A sound record having a cut out laterally undulatory groove of substantially constant depth, the walls of said groove diverging from the bottom of the same to the surface of the record.

11. The method of producing sound records consisting in cutting out the material in forming the record groove, as distinguished from marking or tracing, upon a tablet of suitable material by means of the lateral vibrations of a suitable cutting stylus, and forming a record groove of appreciable and substantially uniform depth having lateral undulations corresponding to the sound waves.

12. The method of producing sound records consisting in cutting out the material in forming the record groove, as distinguished from marking or tracing, upon a tablet of suitable material by means of the lateral vibrations of a suitable cutting stylus, and forming a record groove of appreciable and

substantially uniform depth having lateral undulations corresponding to the sound waves, and then reproducing a sound record from the original record groove so cut.

5 13. In the art of recording and reproducing sounds, the method of cutting out a laterally undulatory groove of substantially constant depth in a tablet of suitable material by vibrating laterally a cutting stylus
10 through the medium of sound waves.

14. In the art of recording and reproducing sounds, the method of cutting out a laterally undulatory groove of substantially constant depth in a tablet of suitable material
15 by vibrating laterally a cutting stylus through the medium of sound waves and then forming a duplicate thereof.

15. A record tablet for talking machines having formed therein a laterally undulatory
20 groove of substantially even depth, the walls of which in cross section are in the shape of the segment of an ellipse, widest at the mouth of the groove and gradually diminishing toward the bottom thereof.

25 16. A record tablet for talking machines having formed therein a laterally undulatory groove of substantially even depth, the walls of which in cross section are in the shape of a segment of an ellipse widest at the mouth of
30 the groove, the depth of said groove being slightly less than its width.

17. A record tablet for talking machines having formed therein a spirally disposed laterally undulatory groove of substantially
35 even depth, the walls of which in cross section are in the shape of a segment of an ellipse, the minor axis of which is substantially in the plane of the surface of the record.

18. In a sound recording and reproducing
40 device, a record having a laterally undulatory groove therein of substantially constant depth and width, any cross section of which has the configuration of a segment of an ellipse, the said segment being symmetrical
45 and of maximum width at the mouth of said groove.

19. In a sound recording and reproducing machine, a record having a laterally undula-

tory groove therein of substantially constant depth and width, any cross section of which 50 has a configuration of a segment of an ellipse whose minor axis is substantially parallel with the plane passing through the outer edge of the groove, the said segment being symmetrical and of maximum width at the mouth 55 of said groove.

20. A sound record of wax or other suitable material, having a cut out laterally undulatory groove of substantially constant depth. 60

21. A sound record of wax or other suitable material having a cut out laterally undulatory groove of substantially constant depth, the walls of said groove diverging from the bottom of the same to the surface of 65 the record.

22. The method of producing sound records consisting in cutting out the material in forming the record groove, as distinguished from marking or tracing, upon a tablet of 70 wax or other suitable material by means of the lateral vibrations of a suitable cutting stylus, and forming a record groove of appreciable and substantially uniform depth having lateral undulations corresponding to the 75 sound waves.

23. The method of producing sound records consisting in cutting out the material in forming the record groove, as distinguished from marking or tracing, upon a tablet of 80 wax or other suitable material by means of the lateral vibrations of a suitable cutting stylus, and forming a record groove of appreciable and substantially uniform depth having lateral undulations corresponding to the 85 sound waves, and then reproducing a sound record from the original record groove so cut.

24. A sound record made from a cut out laterally undulatory groove of substantially constant depth. 90

In witness whereof I have hereunto set my hand this 10th day of November, 1904.

ELDRIDGE R. JOHNSON.

Witnesses:

JOHN F. GRADY,
HORACE PETTIT.

No. 896,302.

PATENTED AUG. 18, 1908.

I. KITSEE.
PHONOGRAPHY.
APPLICATION FILED NOV. 1, 1907.

Fig. 1

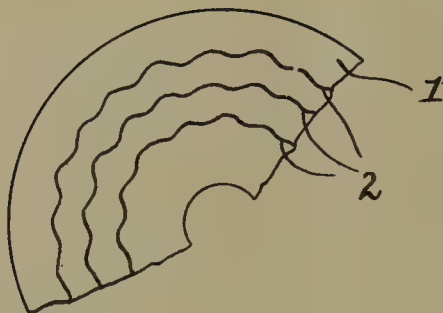
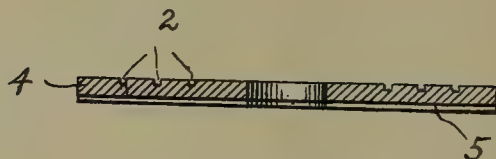


Fig. 2.



Fig. 3.



WITNESSES:

Edith R. Stilley
Mary C. Smith

INVENTOR.

I. Kitsee

UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA.

PHONOGRAPHY.

No. 896,302.

Specification of Letters Patent.

Patented Aug. 18, 1908.

Application filed November 1, 1907. Serial No. 400,175.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Phonography, of which the following is a specification.

My invention relates to an improvement in phonography. Its object is to produce a phonographic record with the aid of which sounds may be reproduced.

In the drawing, Figures 1 and 2 are plan views of records at different stages and Fig. 3 is a sectional view of the finished record.

To produce the final record in accordance with this, my invention, it is first necessary to produce the recording lines, due to the sound waves, in a manner so as to be able to photograph the same; and in the drawing, Fig. 1 illustrates this step of my invention; and in this figure, 1 is the material on which the lines of record are marked and 2 are the lines of record. I prefer that the material 1 should be transparent and the lines 2 opaque to the rays of light. I have found that tracing cloth is well adapted for the purpose and a very expedient way of producing the lines of record is, by simply drawing, with the aid of a colored fluid, the lines on said cloth; the means to draw said lines being operatively related to the phonographic diaphragm. I use this plate or record as a positive to produce photographically a negative therefrom.

The process of producing a photographic negative is well understood and does not need to be enlarged upon here. It suffices to say that those places which are in the positive opaque to the rays of light will be produced in the negative in a manner so as to be transparent to the rays of light and vice versa; the places transparent to the rays of light on the positive will be opaque to the rays of light on the negative, provided that the negative is made and washed in accordance with the usual process, and Fig. 2 represents such a negative; in this figure, 3 designates the parts opaque to the rays of light and 2 the lines of record now transparent to the rays of light.

To produce a record plate, with the aid of which sounds may be reproduced, I have recourse to the following arrangement:—I cover a suitable base, such for instance as a metallic plate, with a comparatively thick layer of gelatin, in which a chrome, such for instance as a bi-chromate of potassium, is dissolved. This plate is carefully screened

from the rays of light. After the plate has dried, that is, ripened—as I call it—it is subjected to the rays of light with the interposition of the negative. The rays of light will, therefore, only strike those parts of the gelatin coating which are not protected by the opaque material of the negative. In other words, only such parts of the gelatin coating will be exposed to the light as correspond to the transparent lines of record on the negative; all other parts of the gelatin coating being screened from the rays of light by the opaque parts of said negative. After the necessary exposure, the gelatin plate is removed from the source of light. When a gelatin, intermixed with a bi-chromate of potassium, is exposed to the rays of light, those parts on which the rays of light fall will become hard and dry, whereas, such parts which are screened from the rays of light will remain in their pliable state. When now a gelatin so prepared is moistened with luke warm water, those parts, formerly exposed to the rays, will remain unaltered, but the parts screened from the rays will take up part of the water and will thereby swell up. The plate so manipulated will present a surface comprising raised and depressed parts. The raised parts are due to the swelling up of the gelatin formerly screened from the light and the depressed parts represent the gelatin not raised through the action of the water. It has been necessary to thus make clear the action of light on gelatin having intermixed therein a bi-chromate of potassium, so that the production of the final record should be well understood by persons versed in the art.

As stated above, the plate of gelatin is, after due exposure to the light, removed from this source. To produce the necessary change in this gelatin plate, so as to be able to use the lines of record for the reproduction of sound, it is necessary to depress these lines, or what is the same—to raise the parts intervening, and for this purpose, I subject the plate to the action of moisture. Fig. 3 represents such final record and in this record, 5 is the support plate; 4 the prepared gelatin and 2 are the lines of record, here shown in intaglio.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The method of producing phonographic records, which consists in obtaining a positive of the sound waves, then producing a

negative therefrom with portions thereof transparent to rays of light, then exposing a sensitized gelatinous surface through the transparent portions of said negative to the
5 action of the light rays, and finally raising the portions of the sensitized surface not exposed by the negative, whereby the exposed portions are depressed relatively to the unexposed portions.

10 2. The method of producing phonographic records, which consists in recording the sound waves in a manner to render them susceptible of photographic reproduction, then producing photographically a negative
15 therefrom, then exposing a sensitized gelatinous surface through the transparent portions of said negative to the action of light rays, and finally raising the portions of the sensitized surface not exposed by the negative,
20 whereby the exposed portions are depressed relatively to the unexposed portions.

3. The method of producing phonographic records, which consists in recording the sound waves in opaque lines upon a transparent body to obtain a positive of said
25 sound waves, then producing photographically a negative thereof, then exposing a sensitized gelatinous surface through the transparent portions of said negative to the action of light rays, and finally raising the portions
30 of the sensitized surface not exposed by the negative, whereby the exposed portions are depressed relatively to the unexposed portions.

35 4. The method of producing phonographic records, which consists in obtaining a positive of the sound waves, then producing a negative therefrom with portions thereof transparent to rays of light, then exposing a

chromated gelatinous surface through the transparent portions of said negative to the
40 action of the light rays, and finally subjecting to the action of moisture the portions of the surface not exposed by the negative, whereby said portions are raised relatively to the
45 exposed portions.

5. The method of producing phonographic records, which consists in recording the sound waves in a manner to render them susceptible of photographic reproduction,
50 then producing photographically a negative therefrom, then exposing a chromated gelatinous surface through the transparent portions of said negative to the action of light rays, and finally subjecting to the action of
55 moisture the portions of the surface not exposed by the negative, whereby said portions are raised relatively to the exposed portions.

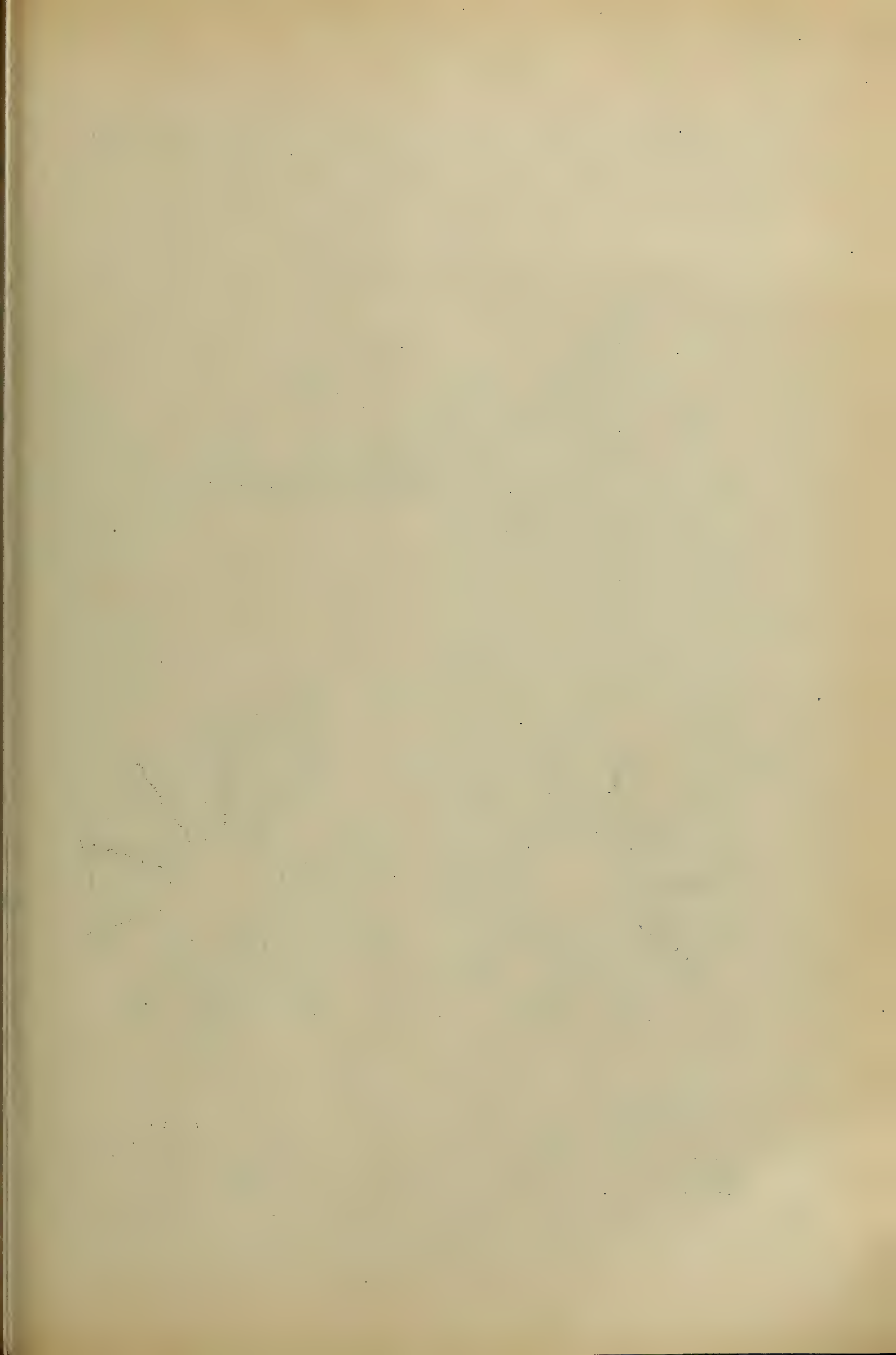
6. The method of producing phonographic records, which consists in recording the sound waves in opaque lines upon a transparent body to obtain a positive of said
60 sound waves, then producing photographically a negative thereof, then exposing a chromated gelatinous surface through the transparent portions of said negative to the action of light rays, and finally subjecting to the action of moisture the portions of the surface not exposed by the negative, whereby
65 said portions are raised relatively to the exposed portions.
70

In testimony whereof I affix my signature in presence of two witnesses.

ISIDOR KITSEE.

Witnesses:

EDITH R. STILLEY,
MARY C. SMITH.



No. 896,672.

PATENTED AUG. 18, 1908.

L. L. TERHUNE.
HORN.

APPLICATION FILED SEPT. 8, 1906.

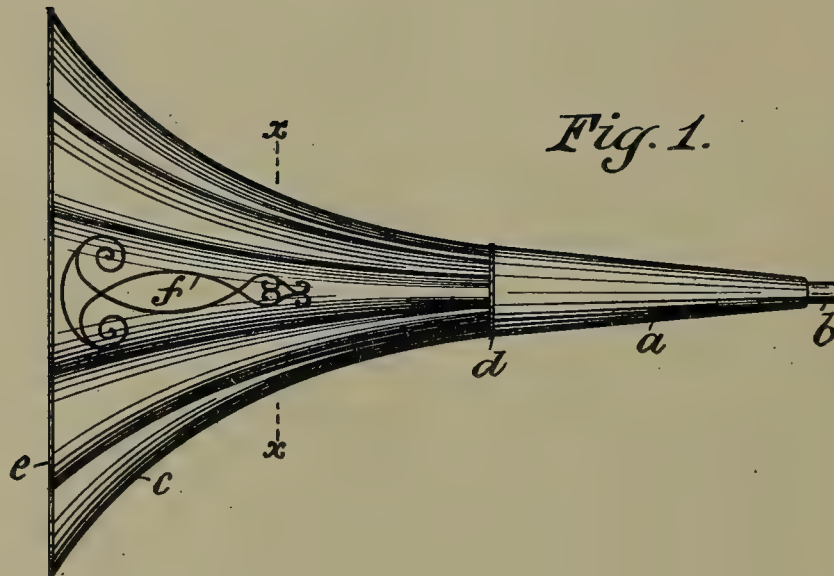


Fig. 1.

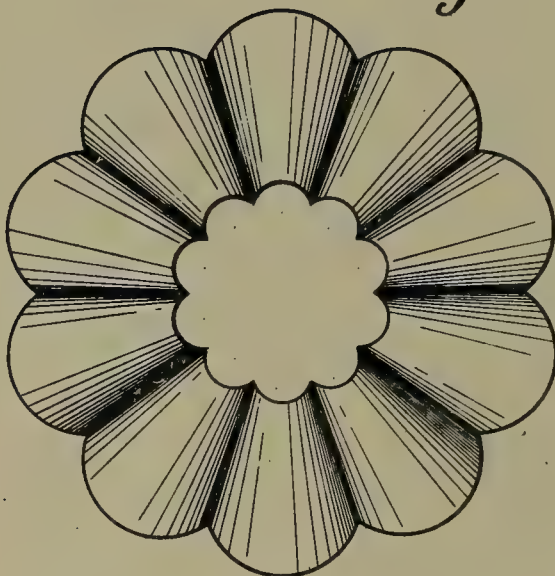


Fig. 2.

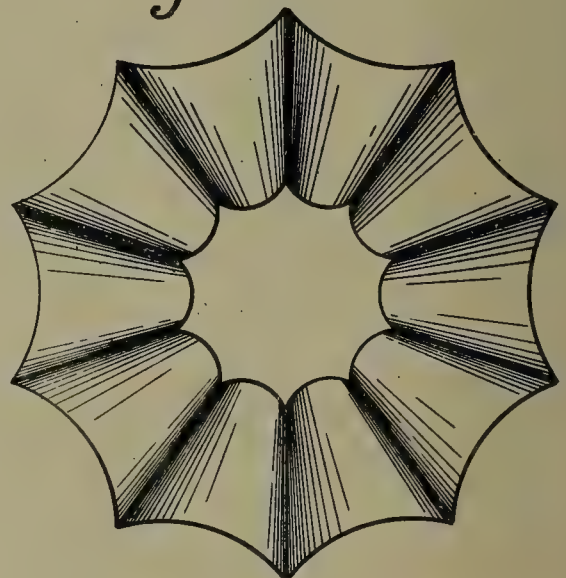


Fig. 3.

WITNESSES:

C. A. Alliston.
Edward S. Black

INVENTOR

Leonard L. Terhune
BY
Fischer Sanders.
ATTORNEYS.

UNITED STATES PATENT OFFICE.

LEONARD L. TERHUNE, OF NEWARK, NEW JERSEY.

HORN.

No. 896,672.

Specification of Letters Patent.

Patented Aug. 18, 1908.

Application filed September 8, 1906. Serial No. 333,815.

To all whom it may concern:

Be it known that I, LEONARD L. TERHUNE, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Horns; and I do hereby declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same.

The object of my invention is to produce a horn for use in amplifying the vibrations produced by the sound box of a phonograph or like instrument, of such a size that it shall possess greater strength for a given weight of material used and at the same time, improve the carrying and amplifying qualities of such an instrument.

Hitherto, in the manufacture and shipment of horns, great difficulty has been experienced in producing a horn of the requisite strength to stand the wear and tear of rough usage from the thin material which it is necessary to use in such manufacture. I have found that, by making up the horn of elements which have short curvature, I am able to produce a horn from relatively light material which shall have, not only the requisite strength, but improved sound carrying and amplifying qualities.

The configuration of the bell and body of the horn lends itself admirably to the manufacture of the structure from other materials than sheet-metal, as for example, papier mâché or glass, and in case I use either of the latter named materials, the whole horn, *i. e.*, body and bell mouth may be pressed to shape in suitable molds or dies, thereby forming horns of a single integral piece of material, and the resulting horns will be found to possess greater strength and better sound carrying qualities than if made up of separate parts from those materials. In some cases, I may make the conical body of metal as usual and the bell of glass, papier mâché or other suitable material. In any case, the petal sections are both longitudinally and laterally arc-shaped.

In the accompanying drawings, forming a part of this specification, Figure 1 is a side view of a complete horn, embodying my improvements. Fig. 2 is a cross-section on line $x-x$ of Fig. 1, and Fig. 3 is a similar cross-section of a modified form.

Similar letters of reference refer to like parts throughout the specification and drawings.

The horn illustrated in Fig. 1 may be described as composed of the body *a* of conical shape having at its smaller end the integral ferrule *b*, and the bell or flaring part *c*. The body *a* and the ferrule *b* are of any usual or preferred construction and are ordinarily made by shaping a piece of sheet metal into such form and providing a bead or groove *d* at its larger end for the reception of a flange formed upon the smaller end of the bell *c*.

My improvement resides more particularly in the form, shape and structure of the bell mouth *c*, which consists of a plurality of what has come to be known in the art as "petals", from their well known resemblance to the petals of a bell shaped flower. The bell as illustrated in Fig. 2 consists of a plurality of petals curved both longitudinally and in cross-section, and united together at their adjacent edges by any desired means as for example, by a lock seam, when the horn is made up of sheet metal or united integrally when made of glass, papier mâché or other similar material. Each petal is laterally curved so as to present in cross-section, the arc of a circle of less radius than the corresponding radius of the bell mouth at that point.

The outer ends of the petals are so shaped that when they are united to form the bell, their outer margins all lie in the same plane as indicated at *e*, so that when the horn is rested upon the bell upon the floor or any level surface, each one of the petals will find a full and complete bearing upon such level surface, and not, as has hitherto been the case, rest upon some projecting point or scallop. In the form illustrated in Fig. 3, the petals instead of being convex outwardly as shown in Fig. 2, are convex inwardly, while the outer ends of the petals are shaped so as to lie in the same plane as disclosed in the structure illustrated in Figs. 1 and 2. In order to lend stiffness to the individual petals, I may impress upon their surfaces, any scroll or design *f* as desired; this scroll or design is pressed inwardly from the outer surface of the horn, and forms what may be termed, a corrugation in each of the petals, and appearing in relief upon the inner side, adds much to the beauty of the horn. The bell *c* after be-

ing formed from its component petals is provided with a flange or rib at its smaller end, which is fitted into the grooved bead *d* and firmly united to the body *a* in the usual or
5 any preferred manner. When the bell is made integral, as of glass, papier mâché, etc., the flange above referred to is formed upon its smaller end and fitted into said groove *d*,
10 or in case the entire horn is integral as of other materials, than sheet metal, the bell and body may be separated by a bead the external shape of which is identical with the grooved bead *d*. It will thus be noted that
15 each one of the petals formed either as illustrated in Fig. 2 or Fig. 3, produce an arch shaped structure very rigid because of the comparative shortness of the lateral curvature of the parts, and thereby, less liable to distortion through rough usage. I find also,
20 that horns of this character are capable of producing clearer and less metallic reproductions, than is the case where the petals are substantially plain in cross-section.

I claim:

25 1. A horn for amplifying sound, compris-

ing a conical horn body and a flaring bell mouth rigidly secured to said body, said bell mouth composed of a plurality of petal sections secured together at their longitudinal edges, each section being independently
30 curved laterally in the arc of a circle of less radius than the corresponding radius of the bell mouth and longitudinally curved throughout its length, said petal sections having their outer margins all lying in a plane
35 perpendicular to the axis of the horn.

2. A horn bell composed of a plurality of petal sections, each section being curved laterally in the arc of a circle of less radius than the corresponding radius of the bell mouth,
40 said sections being joined together at their meeting edges with the outer margins of said petal sections all lying in a plane perpendicular to the axis of the horn.

This specification signed and witnessed
45 this 25th day of August 1906.

LEONARD L. TERHUNE.

Witnesses:

W. A. LAURUNCE,

C. A. ALLISTON.

No. 896,950.

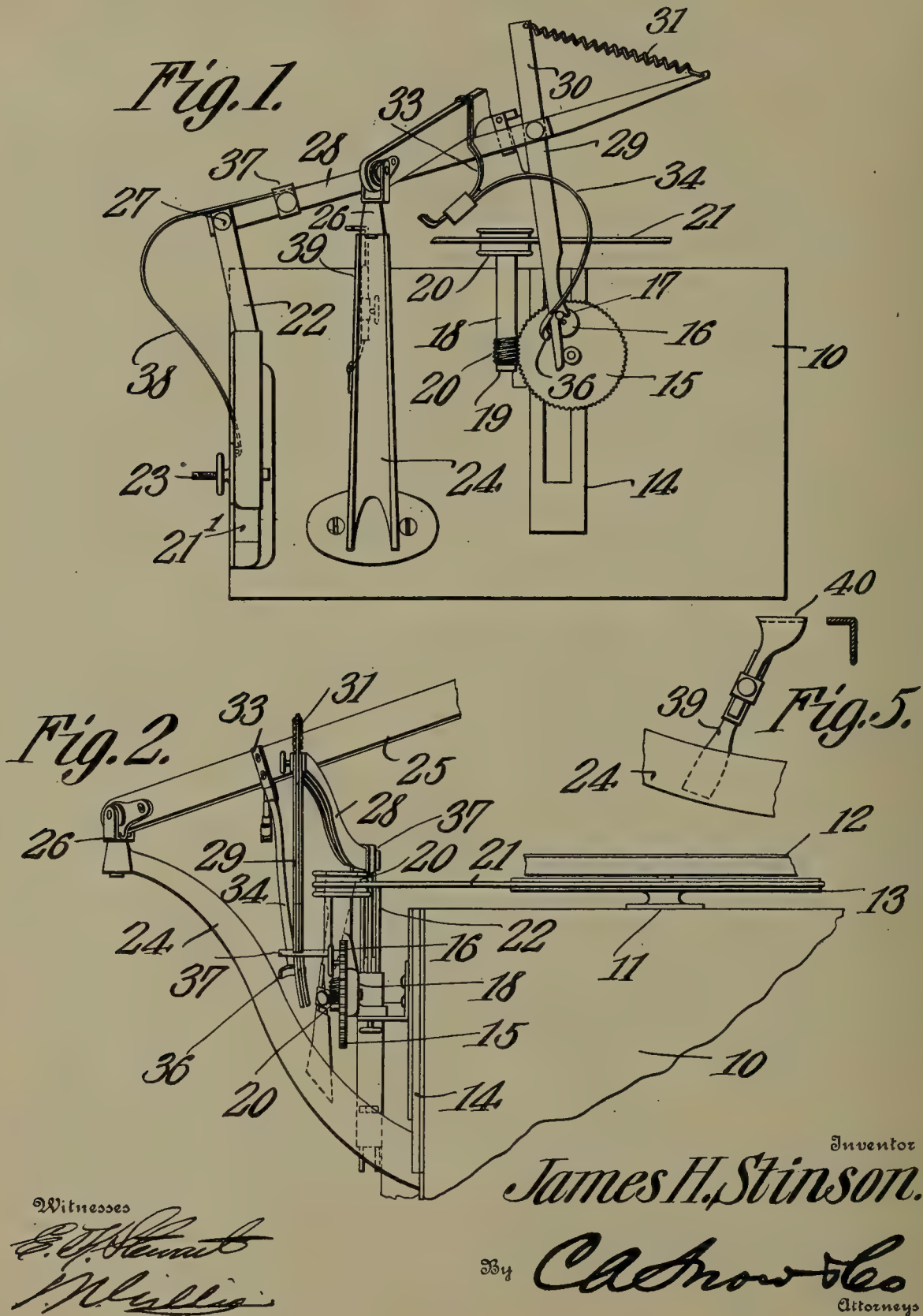
PATENTED AUG. 25, 1908.

J. H. STINSON.

REPEATING MECHANISM FOR SOUND REPRODUCING MACHINES.

APPLICATION FILED MAR. 16, 1908.

2 SHEETS—SHEET 1.



Witnesses

E. J. Stinson
W. H. Stinson

Inventor
James H. Stinson.

By *C. A. Snow & Co.*
Attorneys

No. 896,950.

PATENTED AUG. 25, 1908.

J. H. STINSON.

REPEATING MECHANISM FOR SOUND REPRODUCING MACHINES.

APPLICATION FILED MAR. 16, 1908.

2 SHEETS—SHEET 2.

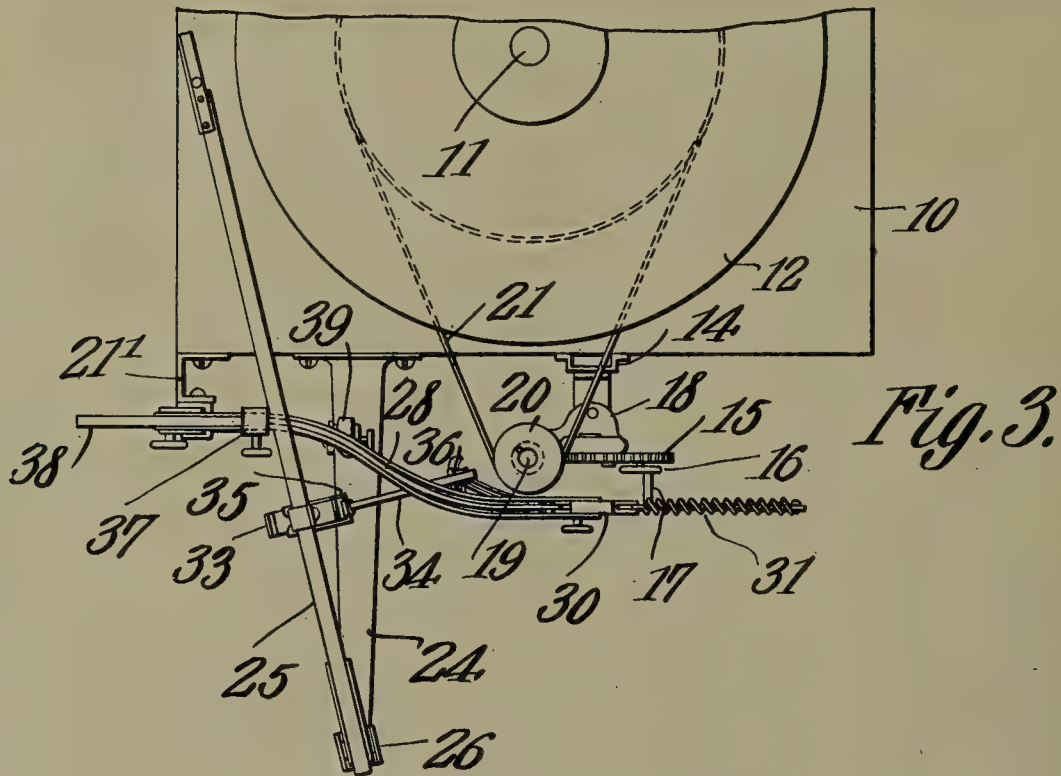


Fig. 3.

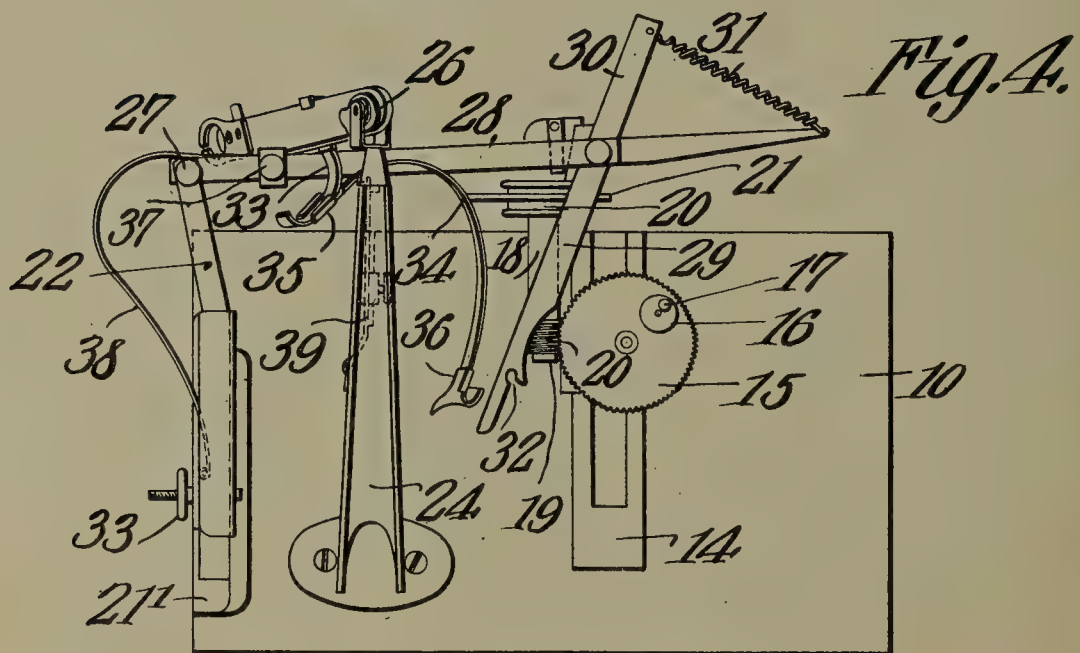


Fig. 4.

Inventor

James H. Stinson.

Witnesses

E. J. Stewart
M. L. Miller

By

C. A. Snow & Co.

Attorneys

UNITED STATES PATENT OFFICE.

JAMES H. STINSON, OF COOKE, MONTANA.

REPEATING MECHANISM FOR SOUND-REPRODUCING MACHINES.

No. 896,950.

Specification of Letters Patent.

Patented Aug. 25, 1908.

Application filed March 16, 1908. Serial No. 421,311.

To all whom it may concern:

Be it known that I, JAMES H. STINSON, a citizen of the United States, residing at Cooke, in the county of Park and State of Montana, have invented a new and useful Repeating Mechanism for Sound-Reproducing Machines, of which the following is a specification.

This invention relates to machines for the reproduction of sound, commonly known as phonographs or graphophones, and its object is to provide an improved means whereby the needle commonly used in the reproducer will be caused to return to the point of starting automatically after a piece has been played.

A further object of the invention is to provide means by which this may be done without injury to the record or other parts of the machine.

The invention consists in certain novel features of construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawing, and specifically claimed.

In the accompanying drawings:—Figure 1 is a front elevation of the machine constructed in accordance with this invention, the parts being in position for the return of the needle. Fig. 2 is a side elevation of the same. Fig. 3 is a plan view thereof. Fig. 4 is a front elevation showing the parts in the position assumed when the needle has been returned and is ready to repeat the piece. Fig. 5 is a detail of one of the stops used in this device.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

There is here shown a device attached to a phonograph of the disk type, although it will be obvious that by certain changes to be herein described, this device may be used equally well for machines of the cylinder type.

The box containing the driving mechanism is indicated by the numeral 10. At 11 is shown the driving spindle, provided with the usual platen 12.

The device in general comprises a trip arranged for synchronous movement with the record, a latch engaging the trip, a cam member or bar, and a horn supporting member arranged to be actuated thereby.

The trip and means for synchronously

operating it comprises in the present form certain details now to be described. Held in any desired position, but preferably between said platen and the box, is a pulley 13. Mounted on a slide 14 attached to the side of the box is a worm wheel 15 whereon is pivotally mounted a disk 16 provided with a pin 17 projecting therefrom. The disk 16 is arranged so that it may be clamped to the worm wheel 15 in any desired position around the pivot, thus changing the distance of the pin 17 from the center of the worm wheel 15, as may be desired. The worm wheel 15 is mounted on the slide 14 so as to be adjustable in the direction of the length thereof. On the slide 14 is formed a bracket 18 supporting a worm shaft 19, provided with a worm 20, meshing with the worm wheel 15. Upon the shaft 19 is, also, mounted a pulley 20 and a cord 21 serves to connect the pulley 20 with the pulley 13 carried on the spindle 11. It will thus be observed that the rotation of the spindle 11 serves to drive through the pulleys and worm and gear connection the pin 17 in a circular path around the center of the worm wheel 15.

The details of the cam member and horn supporting member are here shown to consist of certain parts as follows. A slide 21' is mounted on the casing 10, and in this slide is held a fulcrum bar 22 adjustable on said slide by any desired means, as the thumb screw 23. Between the slides 14 and 21 is mounted the usual horn arm 24 having a horn supporting member 25 pivoted thereto, as at 26, said member being, also, arranged to swing at the point 26 in the usual member. On this bar is supported the horn and reproducer which are not deemed necessary to be here shown.

At the upper end of the fulcrum bar 22 is provided a pivot 27 from which extends a cam member 28 arranged to pass beneath the bar 25. Pivoted at a point near the outer end of the bar 28 is a swinging latch 29, preferably provided with an upwardly extending arm 30 connected to the outer end of the bar 28 by a spring as at 31. The lower end of the swinging latch is provided with a notch 32, of such size and shape as to receive the pin 17 when in proper position. Mounted upon the bar 25 is an arm 33 carrying a spring 34 adjustably mounted thereon as at 35. The spring 34 is provided with a later-

ally extending head 36 arranged in the plane of the swinging of the latch 29. An adjustable stop 37 is, also, mounted upon the bar 28 and a counter-balance spring 38 connects the bar 28 with the slide 21 in such manner as to relieve the same of the effect of the weight of the bar 28 and latch lever 29. An adjustable stop 39 is mounted on the arm 24 and is provided with an enlarged head 40 lying in the path of motion of the bar 28.

In the operation of the device, at the beginning of the playing of a record, the parts will be in about the position shown in Fig. 4. The needle having been adjusted to the proper starting point, the stop 37 is moved along the bar 28 until it contacts with the bar 25 as shown in that figure. The machine is starting, and as the needle travels inward on the disk, or lengthwise along the cylinder record, the arm 25 will be moved in the same direction with the needle. This will cause the head 36 of the spring 34 to contact with the latch lever 29 and force the same in a position intersecting the path of the pin 17. At the same time motion transmitted from the pulley 13 to the worm wheel 15 will cause the same to rotate and the pin 17 to move in a circular path. As the pin comes into contact with the lever 29, it will slip into the notch 32 and hooking in that position will raise the bar 28 to the position shown in Fig. 1. The bar 25 will then slide along said lever until it contacts with the stop 37, the action of gravity being assisted by the spring 34. The motion of the pin continuing, that pin will then slip out of the slot 32 and release the latch bar 29, the action of the spring 31 drawing it away and permitting the bar 28 to fall and the parts to again assume the position shown in Fig. 4, thus placing the device in condition to repeat the record. It is to be observed that the pin 17 may be caused to revolve a number of times before contacting with the latch lever 29 and operating the device, so that it is not necessary to so exactly proportion the driving mechanism as to have but one revolution of the wheel 15. It is further to be observed that the adjustable stop 39 can be arranged so as to prevent the bar 28 from dropping too hard and thus permitting the needle to forcibly strike and injure the disk or other record.

In the use of the device with a machine of the cylinder type, it is simply necessary to arrange the pulley 13 in a suitable position, as, for instance, at one end of the cylinder, in place of underneath the platen 12 and the cord 21 may be conducted to the pulley 20 by any desired arrangement of guide pulleys.

It will be obvious that many minor changes in the form and construction of this device may be made without departing from the principles thereof, and it is not, therefore, to be confined to the exact form herein

shown and described, but to include all that properly come within the scope of the invention.

What is claimed is:—

1. In a device of the character described, the combination with a record support, of a movable trip, and means for operating the same synchronously with the record support, a movable horn support, a cam bar for moving said support, a latch mounted on said cam bar adapted to move into and out of the path of said trip arranged to coact with the trip and move the bar to operating position and means to move said latch into the path of the trip.

2. In a device of the character described, the combination with a record support, of a movable trip comprising a revoluble member provided with a latch contacting device, means for operating the same synchronously with the record support, a movable horn support, a cam bar for moving said support, a latch mounted on said cam bar adapted to move into and out of the path of said trip arranged to coact with the trip and move the bar to operating position and means to move said latch into the path of the trip.

3. In a device of the character described, the combination with a record support, of a movable trip comprising a revoluble member and a latch contacting device adjustably mounted thereon, means for operating the same synchronously with the record support, a movable horn support, a cam bar for moving said support, a latch mounted on said cam bar adapted to move into and out of the path of said trip arranged to coact with the trip and move the bar to operating position and means to move said latch into the path of the trip.

4. In a device of the character described, a movable trip comprising a revoluble member, a second member eccentrically and rotatably mounted thereon and arranged to be held in any desired position, and a latch contacting device carried by said second member.

5. In a device of the character described, the combination of a movable trip comprising a revoluble member, a second member eccentrically and rotatably mounted thereon and arranged to be held in any desired position, and a latch contacting device, means for operating the revoluble member synchronously with the record support, a movable horn support, a cam bar for moving said support, a latch member mounted on said cam bar arranged to coact with the trip and move the bar to operating position.

6. In a device of the character described, the combination with a record support, of a revoluble trip, means to operate the same synchronously with the record support comprising a driven gear held to revolve with said trip, a shaft, a driving gear fixed on said shaft, pulleys on said shaft and record support, and

a belt connecting said pulleys, a movable horn support, a cam bar for swinging said support, a latch mounted on said cam bar adapted to move into and out of the path of
 5 said trip arranged to coact with the trip and move the bar to operating position and means to move said latch into the path of the trip.

7. In a device of the character described, the combination with a record support, of a
 10 movable trip, means for operating the same synchronously with the record support, a movable horn support, a cam bar for moving said support, means on said cam bar for limiting the motion of said support, a latch on
 15 said cam bar adapted to move into and out of the path of said trip arranged to coact with the trip and move the bar to operating position and means to move said latch into the path of the trip.

20 8. In a device of the character described, the combination with a record support, of a movable trip, means for operating the same synchronously with the record support, a movable horn support, a cam bar for moving
 25 said support, adjustable means on said cam bar for limiting the motion of said support, a latch on said cam bar arranged to coact with the trip and move the bar adapted to move into and out of the path of said trip to oper-
 30 ating position and means to move said latch into the path of the trip.

9. In a device of the character described, the combination with a record support, of a
 35 movable trip, means for operating the same synchronously with the record support, a movable horn support, a cam bar for moving said support, adjustable means on said cam bar for limiting the motion of said support, an adjustable stop to limit the movement of
 40 said cam bar, a latch on said cam bar adapted to move into and out of the path of said trip arranged to coact with the trip and move the bar to operating position and

means to move said latch into the path of the trip.

10. In a device of the character described, the combination with a record support, of a
 45 movable trip and means for operating the same synchronously with the record support, a movable horn support, a cam bar for moving said support, a latch pivoted on said cam
 50 bar, a spring normally holding said latch out of the path of said trip, and means to move said latch into the path of the trip to coact therewith and move the cam bar to operating
 55 position.

11. In a device of the character described, the combination with a record support, of a
 movable trip and means for operating the same synchronously with the record support, a
 60 movable horn support, a cam bar for moving said support, a latch pivoted on said cam bar, a spring normally holding said latch out of the path of said trip, and means mounted
 65 on said support to move said latch into the path of the trip to coact therewith and move the cam bar to operating position.

12. In a device of the character described, the combination with a record support, of a
 70 movable trip and means for operating the same synchronously with the record support, a movable horn support, a cam bar for moving said support, a latch pivoted on said cam
 75 bar, a spring normally holding said latch out of the path of said trip, and adjustable means mounted on said horn support to move said latch into the path of the trip to coact there-
 with and move the cam bar to operating position.

In testimony that I claim the foregoing as
 80 my own, I have hereto affixed my signature in the presence of two witnesses.

JAMES H. STINSON.

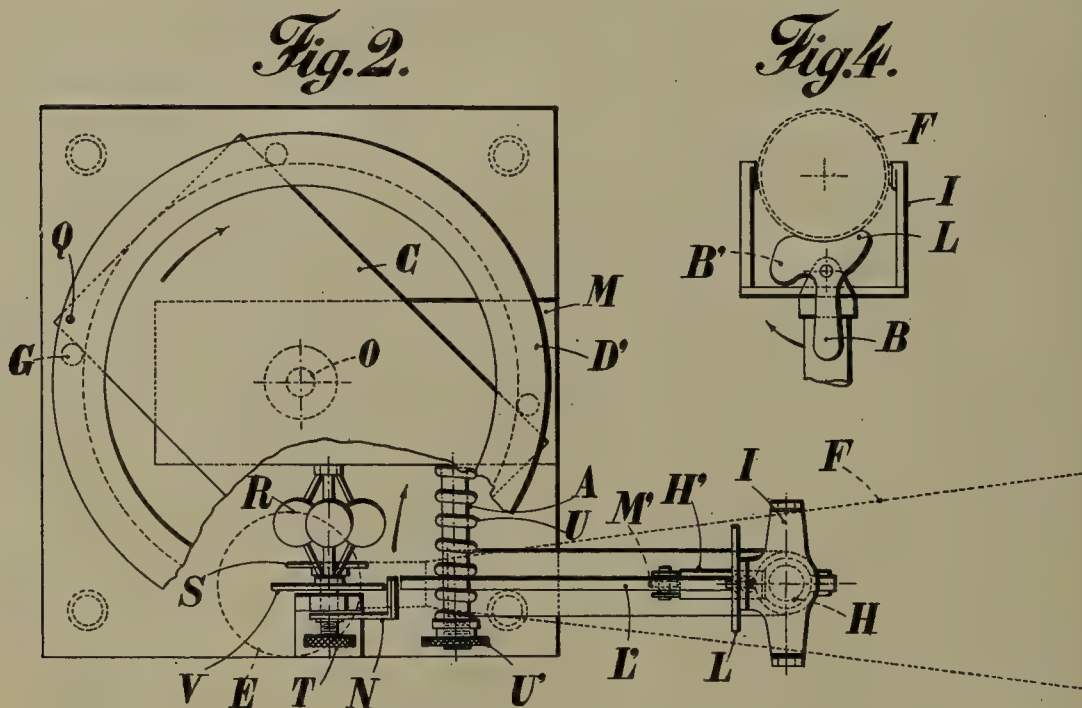
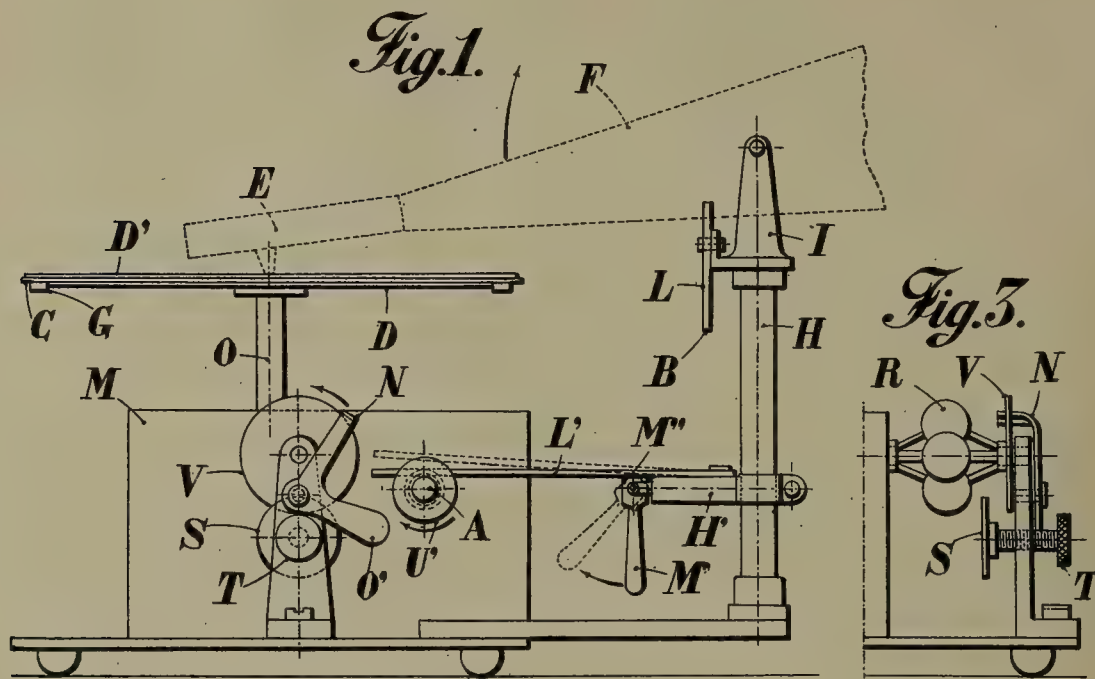
Witnesses:

NELS E. SODERHOLM,
 W. A. BROWN.

E. C. BOULANGER & J. B. DELAYE.

MECHANISM FOR DRIVING THE DIAPHRAGMS OF DISK PHONOGRAPHS.

APPLICATION FILED NOV. 27, 1907.



Witnesses:

W. B. Kessler
Chas. Kessler

Inventors
E. C. Boulanger
Jean Baptiste Delaye

By *James L. Norris*
Atty

UNITED STATES PATENT OFFICE.

ELISE C. BOULANGER AND JEAN BAPTISTE DELAYE, OF PARIS, FRANCE, ASSIGNORS, BY MESNE ASSIGNMENTS, TO SOCIÉTÉ ARTHUR CERF ET CIE., OF PARIS, FRANCE, A CORPORATION OF FRANCE.

- MECHANISM FOR DRIVING THE DIAPHRAGMS OF DISK PHONOGRAPHS.

No. 897,053.

Specification of Letters Patent.

Patented Aug. 25, 1908.

Application filed November 27, 1907. Serial No. 404,047.

To all whom it may concern:

Be it known that we, ELISE CAMUS BOULANGER and JEAN BAPTISTE DELAYE, citizens of the French Republic, residing at Paris, France, have invented certain new and useful Improvements in Mechanism for Driving the Diaphragms of Disk Phonographs, of which the following is a specification.

The invention has for its object to produce the displacement of the sound box of disk phonographs in an automatic manner, while dispensing with the costly parts (which are also difficult to regulate) such as are ordinarily employed.

The displacement is ordinarily effected by means of a screw carriage with which there are engaged at will the jaws of a nut fixed to the fitting for the trumpet and serving to displace it. This disengagement of the sound box from the disk is effected in the mechanism described, in a special manner; in addition, an arrangement described permits of recording or reproducing phonographic post-cards.

Figure 1 is a side elevation of the apparatus as a whole. Fig. 2 is a plan view of the apparatus shown in Fig. 1. Fig. 3 represents a front elevation of the regulating mechanism. Fig. 4 is a front elevation of the sound box lifting mechanism.

The apparatus consists of an ordinary movement M, one of the shafts O of which is vertical and carries the plate D which at will may receive the disk, or by dispensing with the screw for fixing the disk, permits of arranging on the plate a phonographic post-card for reproduction or recording. With this object the card is placed upon the plate and is held at the center by means of a flat ring D' provided with small pins G serving to center it upon the plate. This disk is likewise provided with a point Q which enters the card C, and holds it in the normal position necessary to effect its reproduction or recording.

The trumpet F is mounted on a pillar H upon which it is able to rotate; this trumpet carrying a sound box E which in the usual manner is provided with a diaphragm having a stylus which is placed in contact with the disk. The movement of the trumpet to carry the stylus of the diaphragm to and from engagement with the disk or record is ob-

tained by means of a cam fixed to the summit of the pillar carrying the trumpet; it pivots on a shaft in the direction indicated by the arrow in Fig. 4; this operation results in causing the upper part of the said piece to rotate. This part presents the form of a profiled cam, the part B' being eccentric and causing the trumpet F to rise; when the handle B is turned from right to left, the center of this cam is concave and enables the trumpet to be supported in the position necessitated for the efficient operation of the diaphragm of the sound box. The part L of the cam is less eccentric in the drawing but it may present the same form as B', which would enable the trumpet to be raised whether the handle B is turned to the right or left.

In Fig. 3 the speed regulating mechanism and the braking mechanism are shown. The regulator R is of the ordinary centrifugal ball type and is provided with a disk V against which the shoe N of the brake may be caused to bear at will by acting upon the handle O'. Beneath the shaft of the regulator there is arranged a screw, provided with a plate S against which the disk V strikes and exerts a braking action so as to modify the speed of the regulator.

The mechanism for displacing the sound box which is characteristic of the invention, is as follows: The movement is provided with a shaft A, which in ordinary running controls the driving screw. This shaft is prolonged outside and is provided with a spiral spring U, which surrounds and is able to rotate with the said shaft. At its extremity this shaft carries a screw threaded portion provided with a knob U' enabling the interval separating the convolutions of the spring and consequently their pitch to be modified. A narrow, flexible strip L' engages on the one hand between the convolutions and on the other hand is fixed to the arm H' which is solid with the pillar H which carries the trumpet. When the shaft A rotates, its rotation produces a corresponding rotation of the external part carrying the spring U; the latter rotates and consequently the strip L' which is engaged between the convolutions follows the same movement; the result is the pivoting of the pillar H and the displacement of the trumpet F.

The method of displacement is very sim-

ple; the pitch formed by the convolutions of the spring may be varied at will and the rocking movement of the trumpet may be varied in such a manner as to cause it to correspond with the separation of the convolutions recorded or to be recorded. The spring U may be replaced by a sleeve, externally screw threaded driven by the shaft A upon which it would be mounted with easy friction, this sleeve will also be adjustable; as before, the strip L' engaging between the convolutions of the screw of the sleeve and following its movement. The disengagement of the strip L' from between the convolutions and consequently its independence, is obtained by means of a lever M', which in rocking about its shaft lifts the strip L' by means of the eccentric part M'' with which it is provided. The result of this method of driving is to permit of recording disks wherein the interval separating the furrows recorded varies, this interval being caused to vary either by modifying the interval between the convolutions of the spring or by changing the pitch of the screw threaded sleeve.

Having thus described and ascertained the nature of our invention, and in what manner the same may be performed, we declare that what we claim is:

1. A disk phonograph comprising a revoluble support adapted to receive the disks, a diaphragm having a stylus mounted to traverse a disk on said support and movable toward or from the center thereof to describe spiral convolutions thereon, and a feed screw operatively connected to the revoluble disk support and the diaphragm and adjustable with reference to the pitch thereof to cause corresponding variations in the pitch of the convolutions described by the stylus with respect to a disk on said support.

2. A disk phonograph comprising a revoluble disk support, a diaphragm having a stylus adapted to cooperate with a disk upon said support and mounted to move toward or from the center of such disk, and a feed screw operatively connected to the revoluble support and cooperating with the diaphragm and having means for adjusting the pitch thereof to cause the stylus of the latter to describe convolutions of different pitches upon the disk rotating with said support.

3. A disk phonograph comprising a revoluble disk support, a diaphragm mounted to move toward or from the center of a disk on said support and having a stylus, a feed screw operatively connected to the disk support and to said diaphragm for causing the stylus of the latter to describe convolutions on said disk as the latter rotates, and means for varying the pitch of said screw to cause a corresponding variation in the pitch of the convolutions described upon the disk by the stylus of the diaphragm.

4. A phonograph comprising a revoluble record support, a diaphragm having a stylus adapted to cooperate with a record on said support, and a feed screw having one end supported and operatively connected to the record support and embodying a convoluted spring, a part connected to the diaphragm and cooperating with the convolutions of said spring for feeding the stylus of the diaphragm relatively to the record, and means on the opposite or free end of said screw and cooperating with such spring to vary the pitch thereof.

5. A phonograph comprising a revoluble record support, a diaphragm and stylus mounted to cooperate therewith, and a feed device rotatably connected to the record support and comprising a shaft, a helical spring mounted thereon, a part connected to the diaphragm and engaging between the convolutions of said spring to feed the diaphragm relatively to the record, and a device adjustable axially of said shaft for compressing or expanding said spring to increase or decrease the pitch thereof and thereby correspondingly varying the pitch of the convolutions described by the stylus of the diaphragm with respect to the record.

6. A phonograph comprising a revoluble record support, a diaphragm and stylus mounted to cooperate therewith, and a feed device for the diaphragm comprising a shaft rotatably connected to the record support, a helical spring surrounding said shaft and rotatable therewith, a part connected to the diaphragm and cooperating with the convolutions of said spring for feeding the stylus of the diaphragm relatively to the record, and a nut threaded on said shaft and adjustable axially thereof for compressing or expanding the spring to vary the pitch thereof.

7. A phonograph comprising a revoluble record support, a diaphragm and stylus mounted to cooperate therewith, a feed device comprising a convoluted spring rotatably connected to the record support, and a member movable with the diaphragm and adjustable to and from operative position relatively to the convolutions of said spring.

8. A phonograph comprising a revoluble record support, a rotatable standard, a sound trumpet mounted to rotate with said standard and provided with a diaphragm having a stylus to cooperate with a record on said support, a feed screw rotatably connected to the record support, a member connected to rotate with said standard and movable to and from operative position relatively to the feed screw, and a cam pivoted to said standard and cooperating with said member to disengage the latter from the screw.

9. A phonograph comprising a revoluble record support, a rotatable pillar provided with forked bearing arms at its upper end, a

sound trumpet rotatable with said pillar and pivotally attached to the bearing arms thereon so as to swing in a vertical plane, a diaphragm and stylus on the trumpet movable to and from operative position relatively to a record on said support, and a cam pivoted on a part of the pillar to turn in a plane transverse to the axis of the trumpet and coöperating with the trumpet to support the latter and the diaphragm in an operative or an inoperative position.

10. A disk phonograph comprising a revoluble record supporting plate, a ring surrounding the edge of said plate for clamping a phonographic card thereon, pins for cen-

tering said ring on said plate, the pins being spaced to receive a phonographic card without perforating the same, and a point arranged within the card receiving space between the centering pins and adapted to perforate such card to cause the latter to rotate with said plate. 20

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

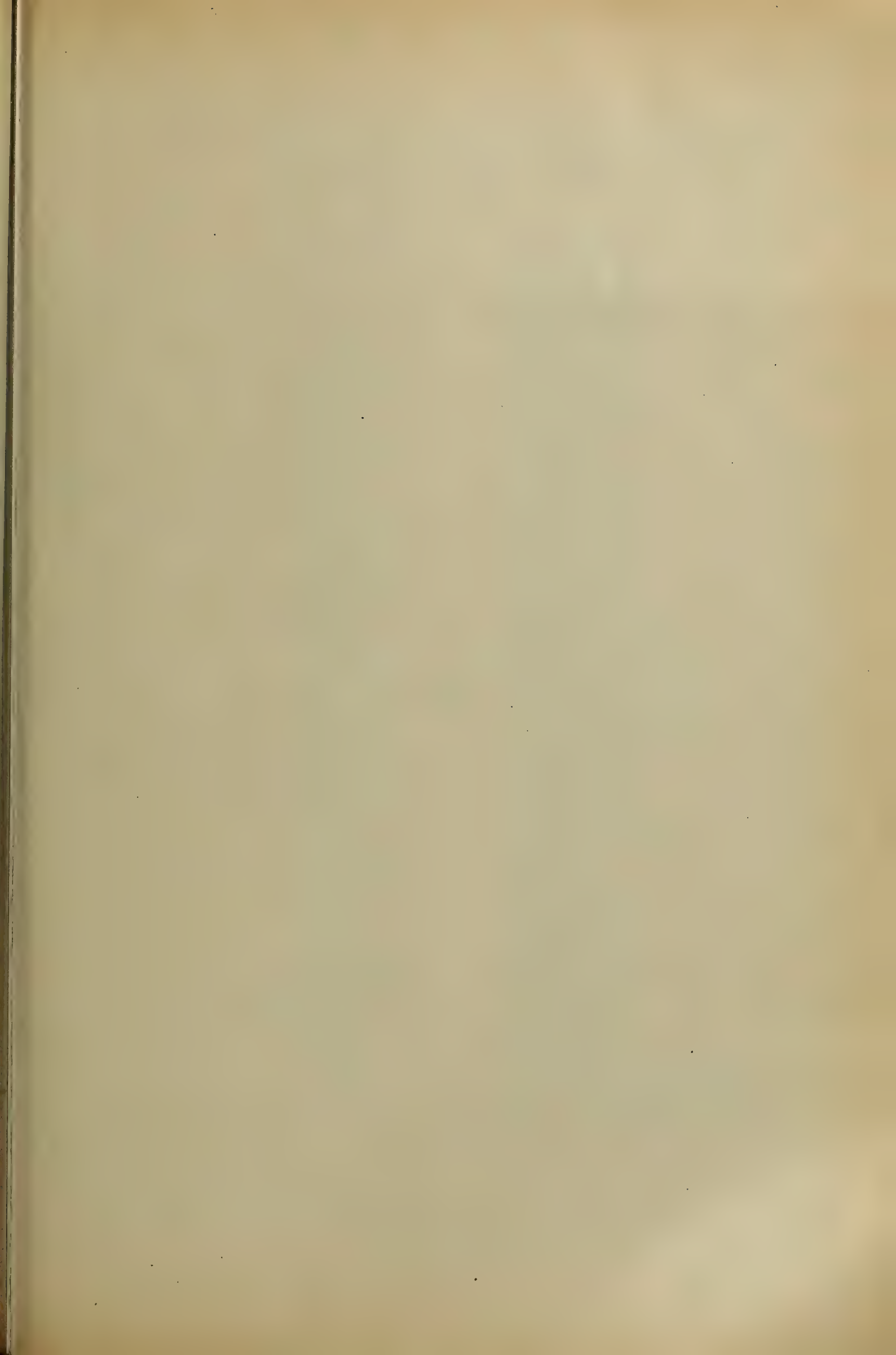
ELISE CAMUS BOULANGER.

JEAN BAPTISTE DELAYE.

Witnesses:

DEAN B. MASON,

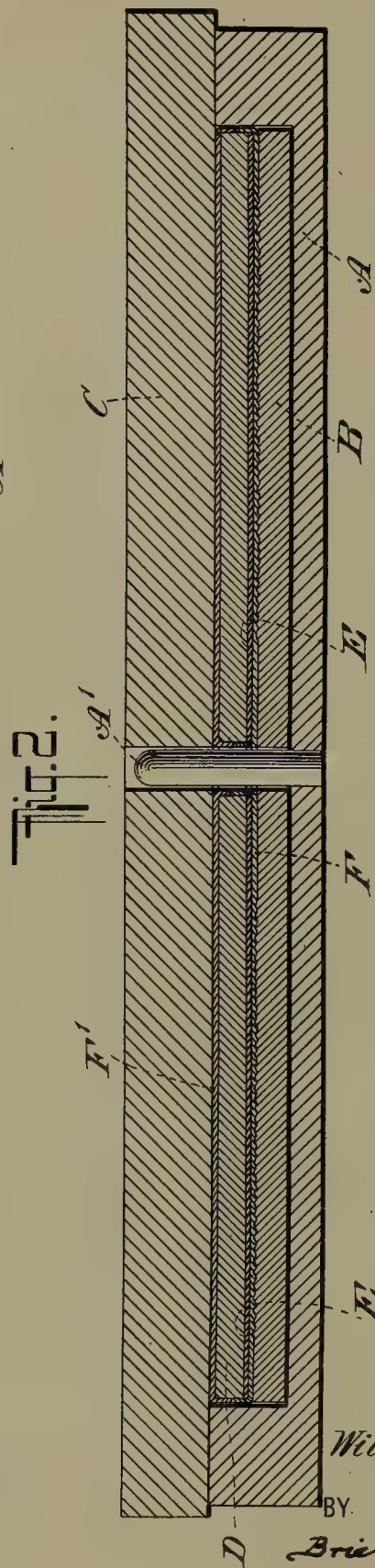
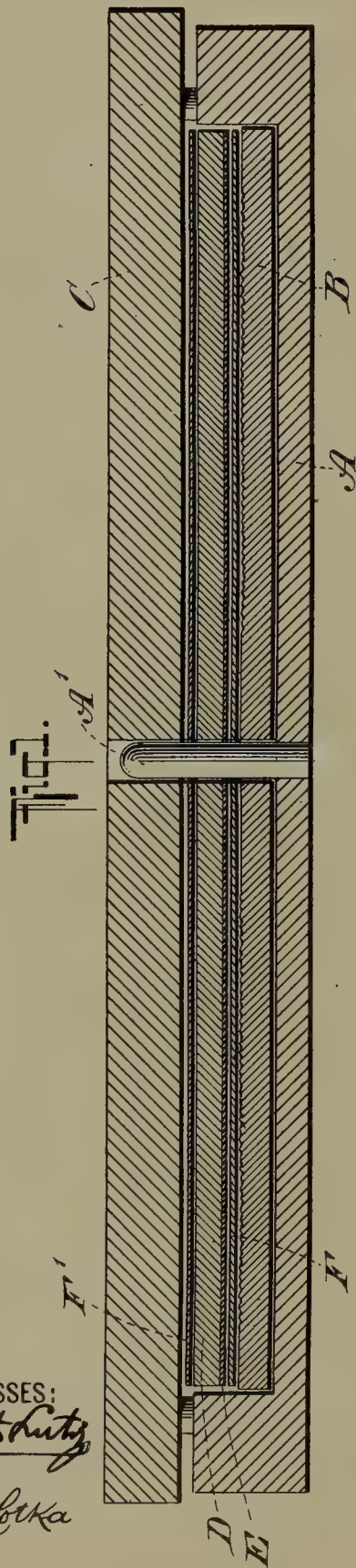
EMILE KLOTZ.



No. 897,254.

PATENTED AUG. 25, 1908.

W. H. HOYT.
METHOD OF MAKING SOUND RECORDS.
APPLICATION FILED MAY 4, 1904.



WITNESSES:
Julius H. Hutz
John Lelka

INVENTOR
William H. Hoyt.
BY
Brien & Knauth
ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM H. HOYT, OF WYOMING, NEW JERSEY.

METHOD OF MAKING SOUND-RECORDS.

No. 897,254.

Specification of Letters Patent.

Patented Aug. 25, 1908.

Application filed May 4, 1904. Serial No. 206,273.

To all whom it may concern:

Be it known that I, WILLIAM H. HOYT, a citizen of the United States, and a resident of Wyoming, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Methods of Making Sound-Records, of which the following is a specification.

My invention relates to methods of making sound records, particularly of the flat or disk type, and has for its object to provide a method for producing a light, strong and durable record of this character which will be practically unbreakable and which will not be affected by changes of temperature or moisture. To this end I make the record of a suitable body, such as cardboard, and provide it with a facing of celluloid or like material, which is connected with the cardboard by means of an intermediate layer or a binder, such as shellac, which also prevents warping of the record.

An apparatus of any suitable construction may be employed in carrying out my method for forming or molding the records, the accompanying drawing illustrating an ordinary form of such apparatus.

Figure 1 shows the parts in position before molding, and Fig. 2 represents them in the position they occupy during molding.

A is the base of the mold, having a central pin A' projected upwardly therefrom and adapted to hold the matrix B, upon the upper surface of which are formed the grooves which produce the record.

C is the follower or presser-plate for effecting the molding.

According to my invention the record is made of a body of cardboard, pasteboard, papier mâché, or other non-plastic substance, indicated in the drawing by the letter D. This body should preferably be somewhat porous or absorbent. I then apply a thin coating of a binder such as shellac or a shellac compound to the body D, at least on one side thereof, but sometimes on both sides. This coating is indicated at E. Upon the upper surface of the matrix B I then place a sheet or disk of suitable plastic material, capable of combining with the shellac or like coating E under the application of pressure and heat. This sheet F may consist of celluloid or shellac composition or like gramophone material. The cardboard or other body D,

coated as above described on at least one of its surfaces, is then placed on top of the sheet F, so that the coating E will engage said sheet. If desired, another sheet F' may be placed on the top of the body D, in which case said body should preferably be coated on both surfaces; but if desired, one of the coatings and the upper sheet F' may be omitted.

It will be understood that the unfinished record, that is, the record before molding, consists of at least two separate parts or disks, one of them being the body D having a coating E and the other being the sheet F adjacent to said coating. In those cases in which the sheet F' is used, the record would consist of three pieces before molding.

The molding is accomplished in the usual way by forcing the plate C toward the matrix, as by hydraulic pressure and under the application of heat. This causes the irregularities of the matrix surface to impress themselves into the celluloid or other sheet F, and at the same time the disk F (and also the disk F', when such is used), are caused to unite with the coating E. The celluloid or other sheet will also be forced over the edge of the body D, so as to protect such edge. This is especially the case when two sheets of celluloid, F, F', are used, in which case the body D will be entirely covered by the celluloid, and will thus be efficiently protected against moisture.

The record, made by my improved method, is exceedingly strong and durable. It may be bent without cracking or breaking, the impression of the record lines is very accurate, moreover, the record can be made of great thinness and therefore extremely light.

I claim as my invention, and desire to secure by Letters Patent:

1. The herein described method of making sound records, which consists in applying a binder to a non-plastic body, interposing a sheet of plastic material between said non-plastic body on the side to which the binder is applied and a matrix, and forcing the body and sheet toward the matrix under the application of heat, to cause the binder and plastic sheet to unite, and the latter to take an impression from the matrix.

2. The herein described method of making sound records, which consists in applying a binder to a porous body, interposing a sheet

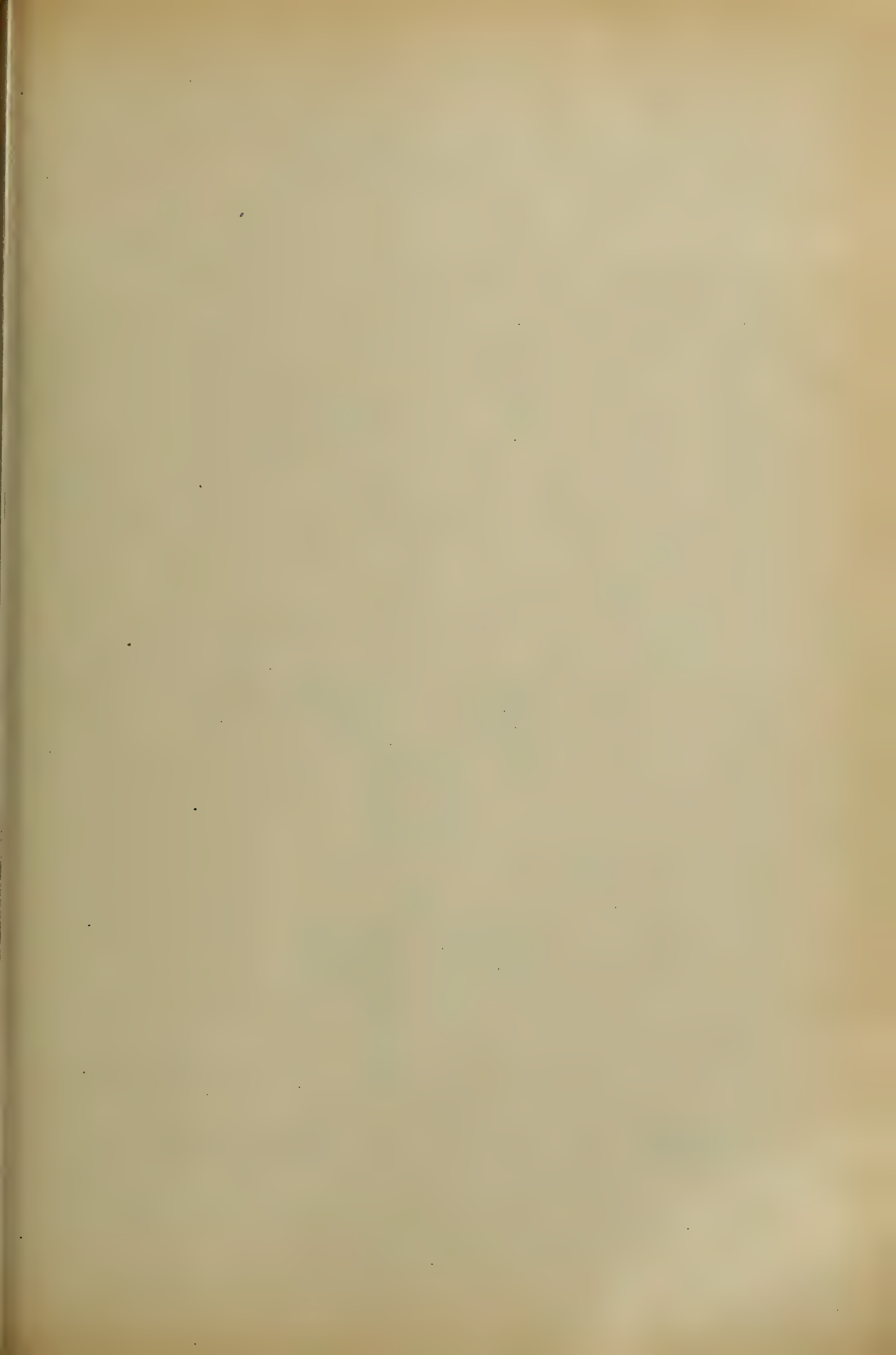
of plastic material between said body on the side to which the binder is applied and a matrix, and forcing the body and sheet toward the matrix under the application of heat, to
5 cause the binder and plastic sheet to unite, and the latter to take an impression from the matrix.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM H. HOYT.

Witnesses:

DANIEL TURNEY,
WM. O. LAUGHNO.



No. 897,774.

PATENTED SEPT. 1, 1908.

W. J. PATTERSON.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED NOV. 23, 1907.

Fig. 1.

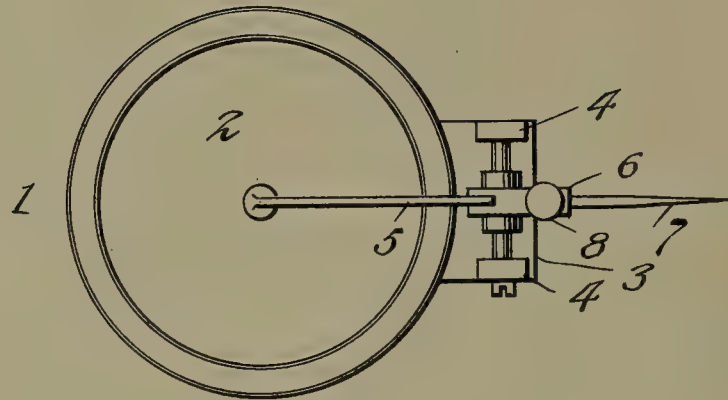


Fig. 2.

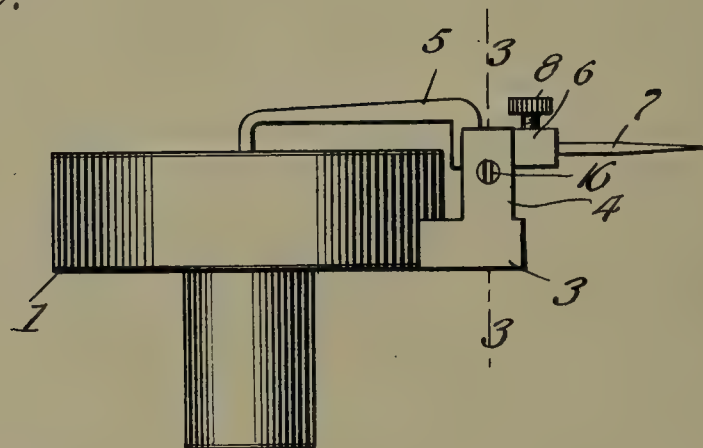
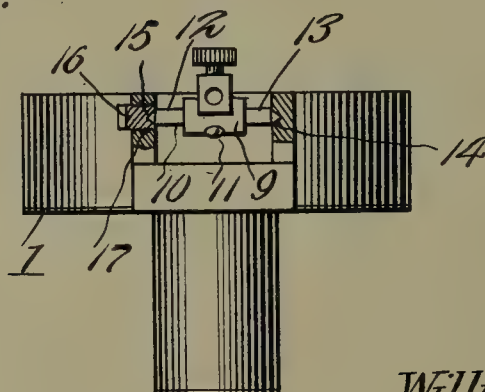


Fig. 3.



Witnesses

Ge. H. Adams Jr.
C. C. Hines.

Inventor

William J. Patterson

By *Victor J. Evans*

Attorney

UNITED STATES PATENT OFFICE.

WILLIAM J. PATTERSON, OF COLORADO SPRINGS, COLORADO.

SOUND-BOX FOR TALKING-MACHINES.

No. 897,774.

Specification of Letters Patent.

Patented Sept. 1, 1908.

Application filed November 23, 1907. Serial No. 403,559.

To all whom it may concern:

Be it known that I, WILLIAM J. PATTERSON, a citizen of the United States, residing at Colorado Springs, in the county of El Paso and State of Colorado, have invented new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

This invention relates to improvements in sound-boxes for talking machines, and particularly to improved means for pivotally mounting the stylus-carrying bar or lever upon the box, the object of the invention being to provide a novel means for mounting the bar by which a free and easy vibratory action thereof under the pressure of the stylus is permitted and a delicate and sensitive transmission of the movements of the needle to the diaphragm insured.

A further object is to provide a construction of mounting for the bar or lever by which the ready application and removal of the bar is permitted, and by which the pivot bearing may be quickly and conveniently adjusted to compensate for wear.

The invention consists of the features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawing, in which:—

Figure 1 is a front or face view of a sound-box embodying my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a sectional elevation on line 3—3 of Fig. 1.

Referring to the drawing, the numeral 1 designates a sound-box which may be of conventional or any preferred form, and constructed of any suitable material, and 2 denotes the diaphragm mounted therein.

Disposed upon one side of the sound-box is a laterally extending block or bracket 3 provided with a pair of spaced flanges or ears 4 disposed at right angles thereto in parallel relation to each other and projecting slightly beyond the front of the box. This block or bracket is designed to pivotally support the stylus-carrying bar or lever 5, which is connected at its inner end in the usual or any preferred manner with the diaphragm 2, and carries at its outer end a socket piece 6 to receive the stylus or needle 7 which is adapted to be clamped therein by a set screw 8. The socket piece 6 is formed or provided upon its under or rear side with a boss or supporting portion 9 having a transverse opening for the passage of a pivot pin or

shaft 10 removably secured thereto by a fastening screw or other suitable fastening 11. The ends of this pin, which extend laterally beyond the opposite sides of the boss, form trunnions or pivot members 12 and 13 journaled in the ears 4 to permit pivotal play of the lever. By this construction the pin or shaft when worn may be disconnected and a new one substituted therefor.

The extremities of the trunnions or pivot pins 12 and 13 are tapered or made of conical form, and the conical end of the pin 13 fits within a correspondingly shaped bearing recess 14 formed in one of the ears 4, while the conical end of the other bearing pin 12 fits within a similar bearing recess 15 in a bearing bushing 16 removably mounted upon the other ear 4. As shown, the said bushing is in the form of a screw plug, having a nicked outer end or head by which it may be adjusted by a screw driver or other tool, and said bushing fits within a screw-threaded receiving opening 17 in the ear. By this construction it will be observed that the bearings may be relatively adjusted by turning the screw to a greater or less extent in and out to secure a fine fit, thus adapting the arm or lever to be mounted for an extremely sensitive vibratory action.

In applying or removing the stylus-carrying bar from the bracket, which in effect forms a supporting yoke, the bushing or screw 16 is turned out to a sufficient extent to permit the pin 12 to move into the opening 17 far enough to disconnect the pin 13 from the recess 14, or to admit of its application within said recess, the opening 17 being of sufficient diameter to allow the pivot-carrying end of the stylus-bar to be tilted or disposed at an angle in the space between the ears, by which the pivot pins may be readily engaged with and disengaged from the bearings for the convenient application and removal of the bar. In the application of the bar, after the pin 13 is fitted in position, the bushing 16 is screwed in until it receives and bears with the desired pressure against the end of the pin 12, and it will be apparent that the degree of pressure may be varied to a nicety, to allow the pivot members to swing with the proper freedom and without undue looseness. It will thus be understood that the needle carrier and the parts thereof are bodily applicable to and removable from the bearing ears, so that a new needle bar and pivot shaft may be applied whenever occasion requires.

Upon loosening the screw 11 and removing the bushing 16, the shaft 13 is removable longitudinally through the opening 17, and a new shaft may be applied in like manner, thus facilitating the operation of applying a new shaft when the one in use has become worn.

It will be seen that the described construction of parts by which the lever or bar is pivotally mounted upon the sound-box not only allows the bar to be expeditiously applied and removed, but adapts the bar to swing with the required degree of freeness and the bearings to be adjusted to compensate for wear.

Having thus fully described the invention, what is claimed as new is:—

A sound-box provided at one side with a lateral bracket having spaced bearing ears extending at right angles therefrom parallel with said side and terminating adjacent the front of the box, one of said ears having directly formed therein a conical bearing recess and the other having formed therein a screw-threaded opening, an adjustable bearing bushing inserted in said opening and having

a niched outer end and formed with a conical bearing recess in its inner end, a stylus-carrying bar provided on its rear side with a boss projecting between the ears and having a transverse opening, a shaft extending through said opening and beyond the sides of the boss and having conical ends journaled in the respective bearing recesses, and a fastening detachably securing the shaft to the boss, the said bar being adapted for tilting movement in the space between the ears when the bushing is turned outward to a prescribed extent to permit of the insertion and withdrawal of said conical ends of the shaft within and from said bearing recesses, whereby the bar and parts as a whole may be bodily applied and removed, said shaft also being insertible and withdrawable longitudinally through the bearing opening when the bushing is removed.

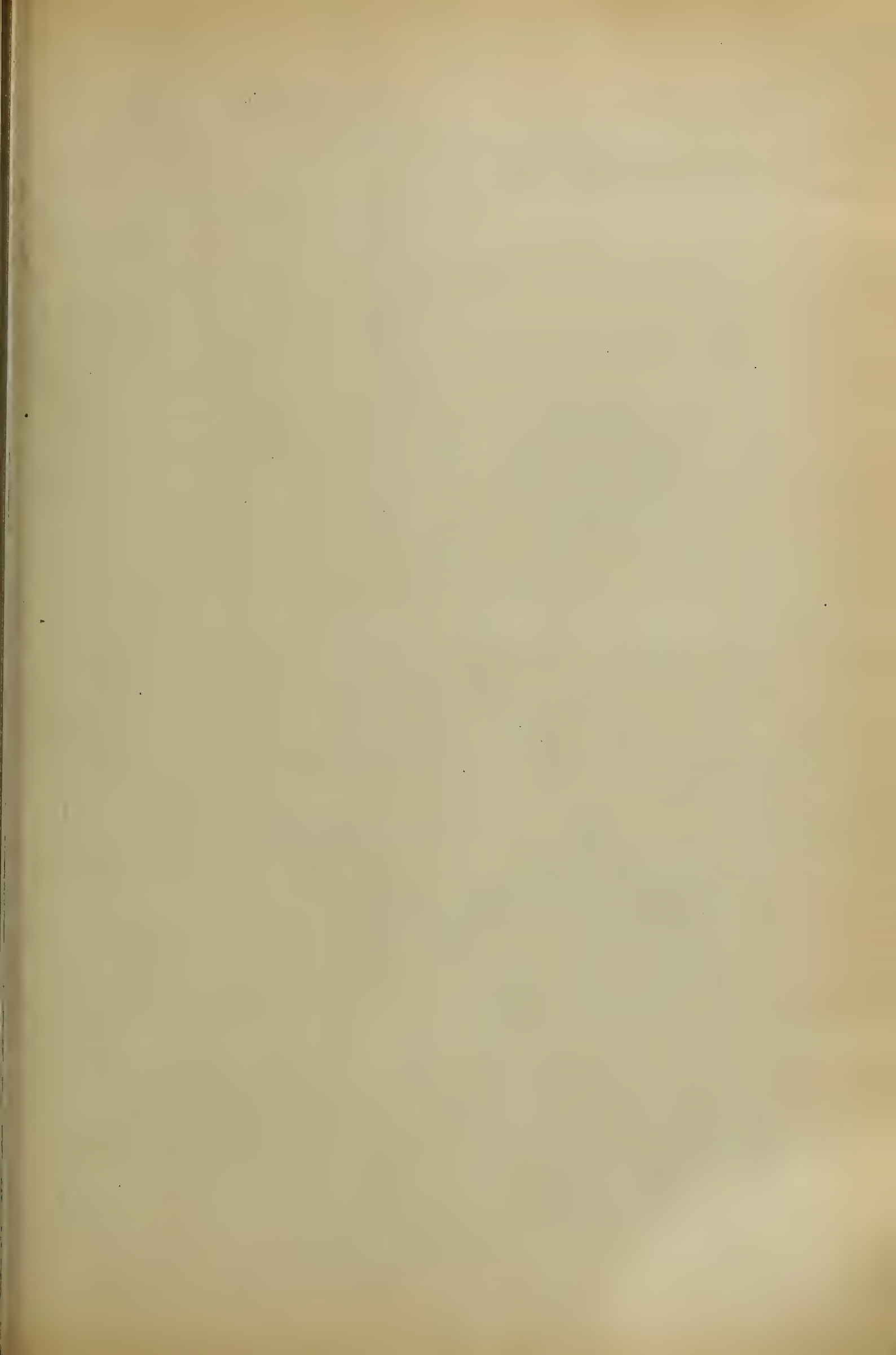
In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM J. PATTERSON.

Witnesses:

HOWARD MARSHALL DODD

WILLIAM JOSEPH PATTERSON, JR.



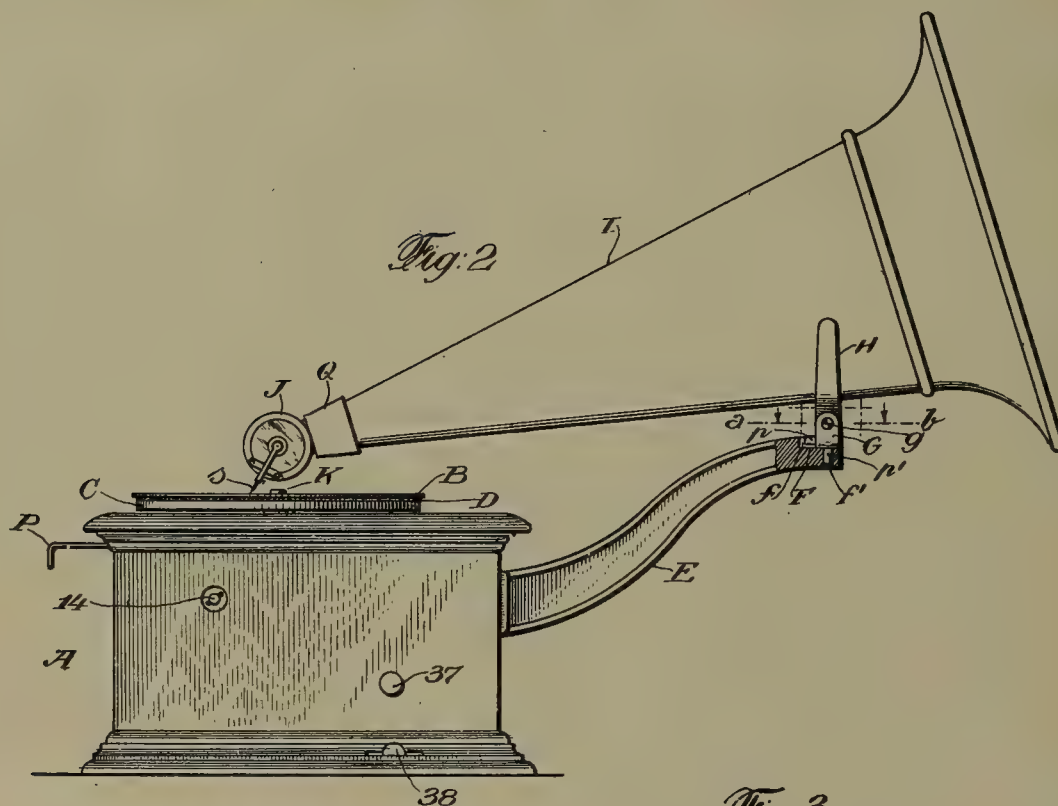
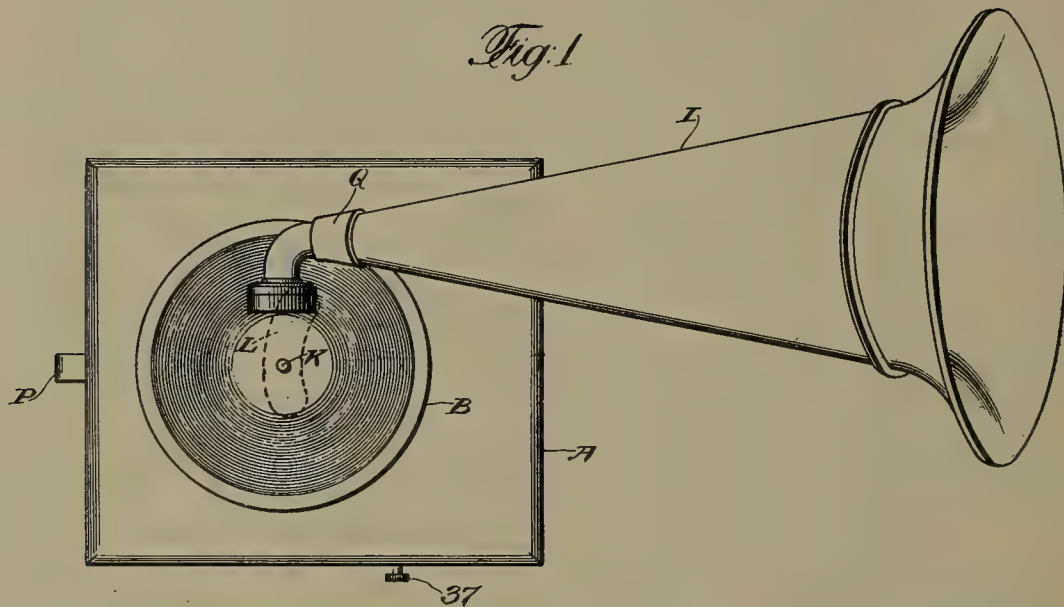
No. 897,836.

PATENTED SEPT. 1, 1908.

E. F. LEEDS & G. RUMPF.
PHONOGRAPH.

APPLICATION FILED JAN. 18, 1908.

5 SHEETS—SHEET 1.



Edward F. Leeds and Inventors
George Rumpf
By the Attorney Louis Hicks

Witnesses:
Harry Adam
Annie J. Irvine.

E. F. LEEDS & G. RUMPF.
PHONOGRAPH.

APPLICATION FILED JAN. 18, 1908.

5 SHEETS—SHEET 2.

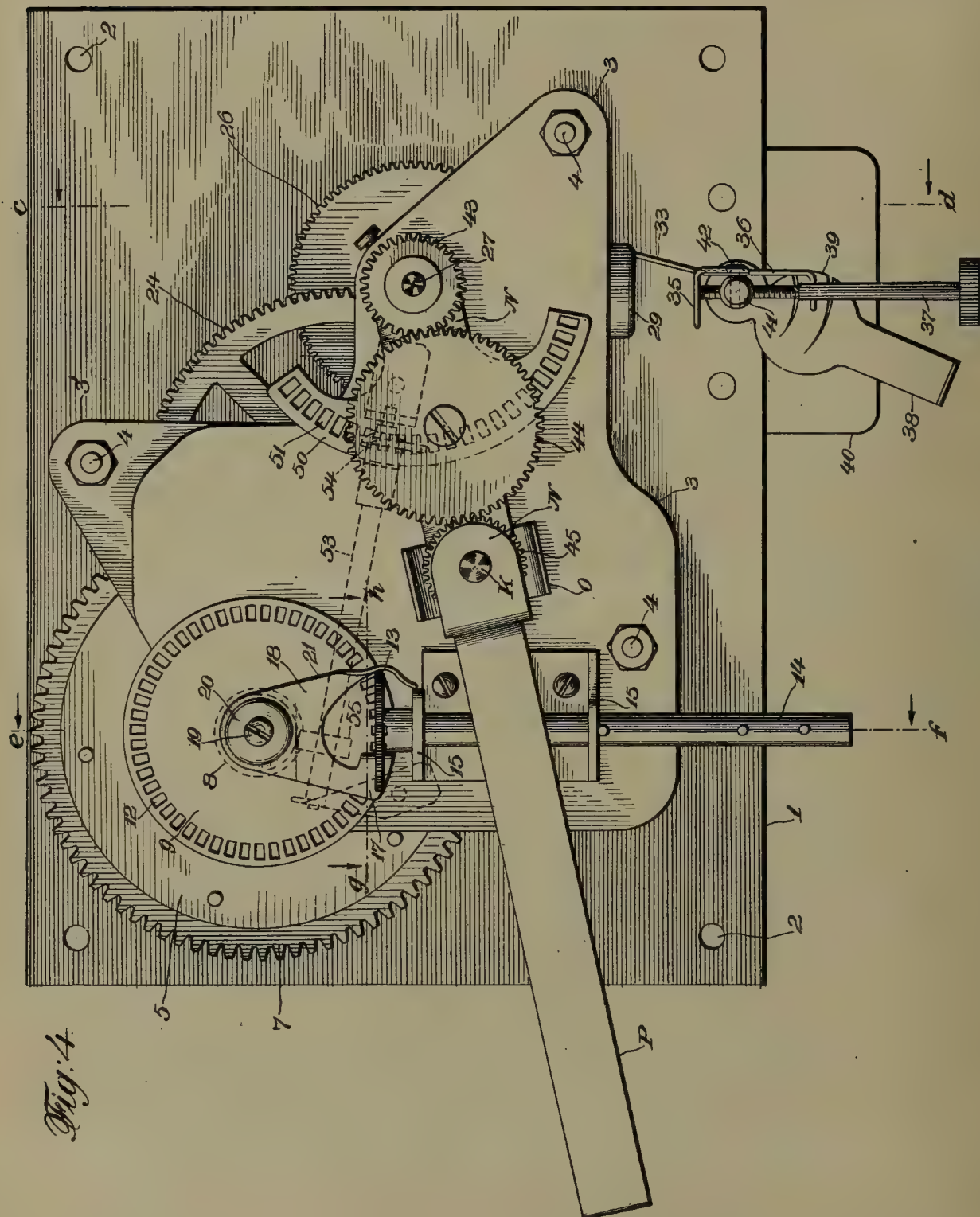
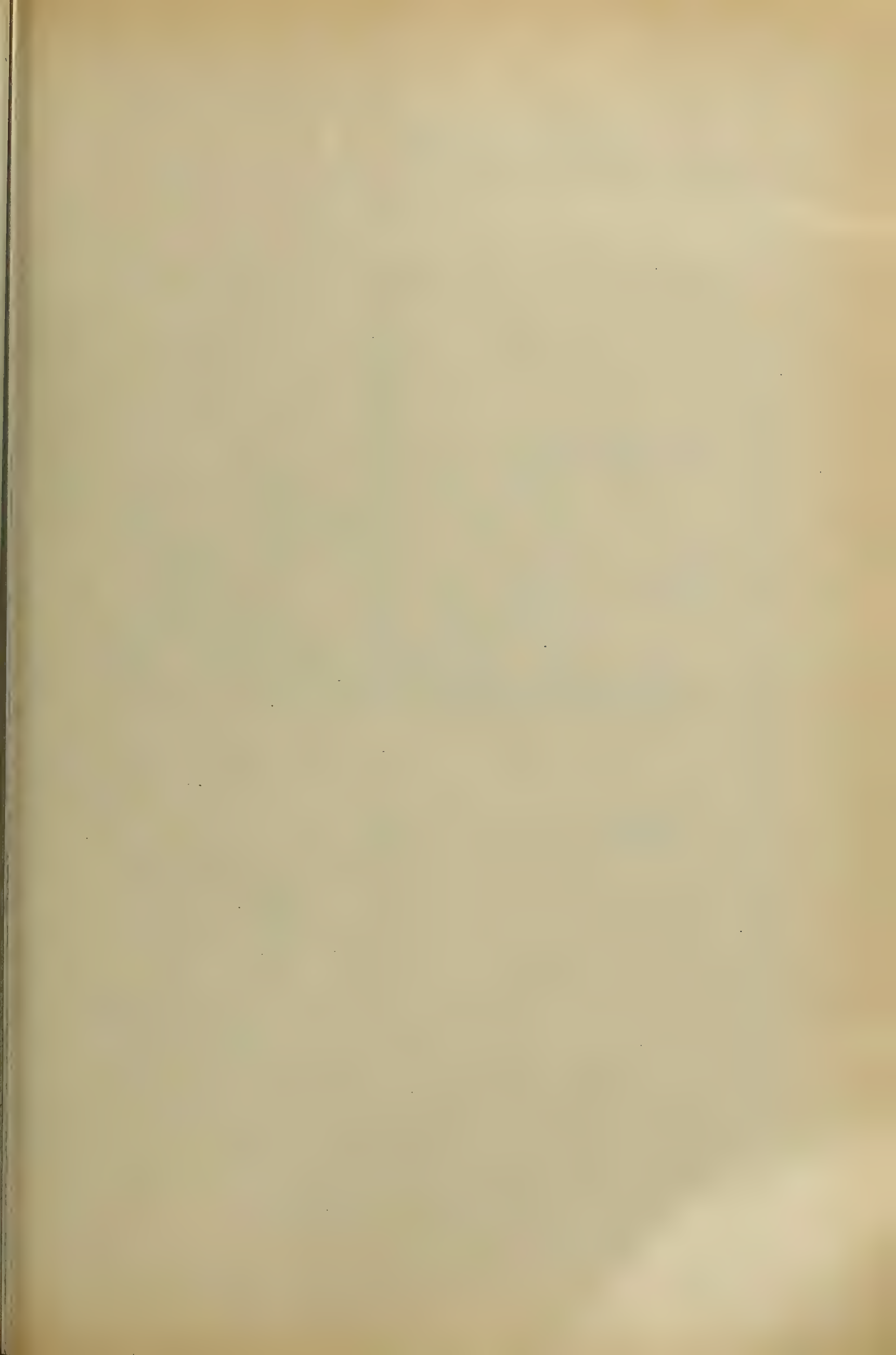


Fig. 4.

Witnesses:
Harry E. Quinn
Annie J. Irvine.

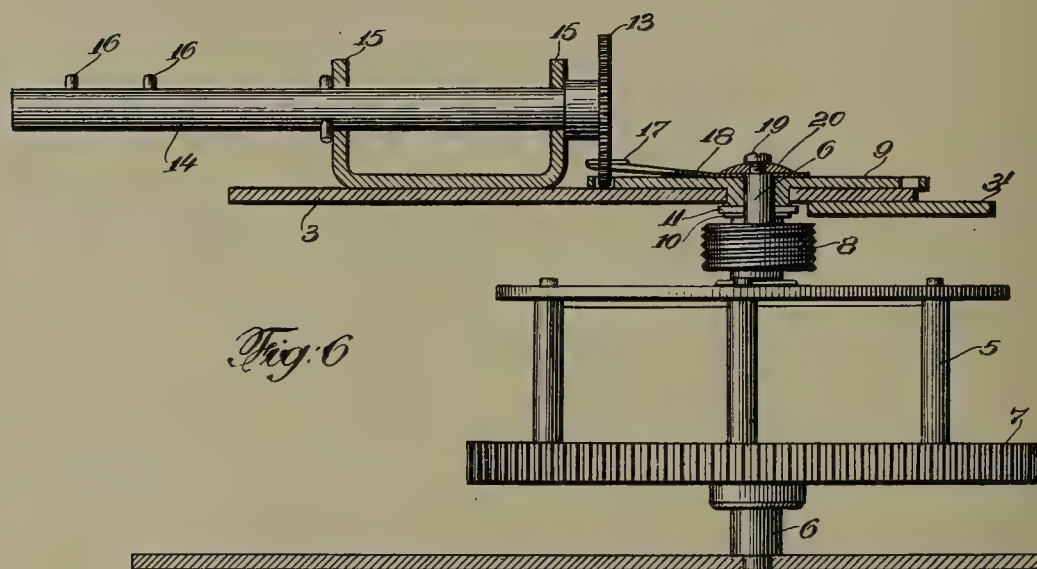
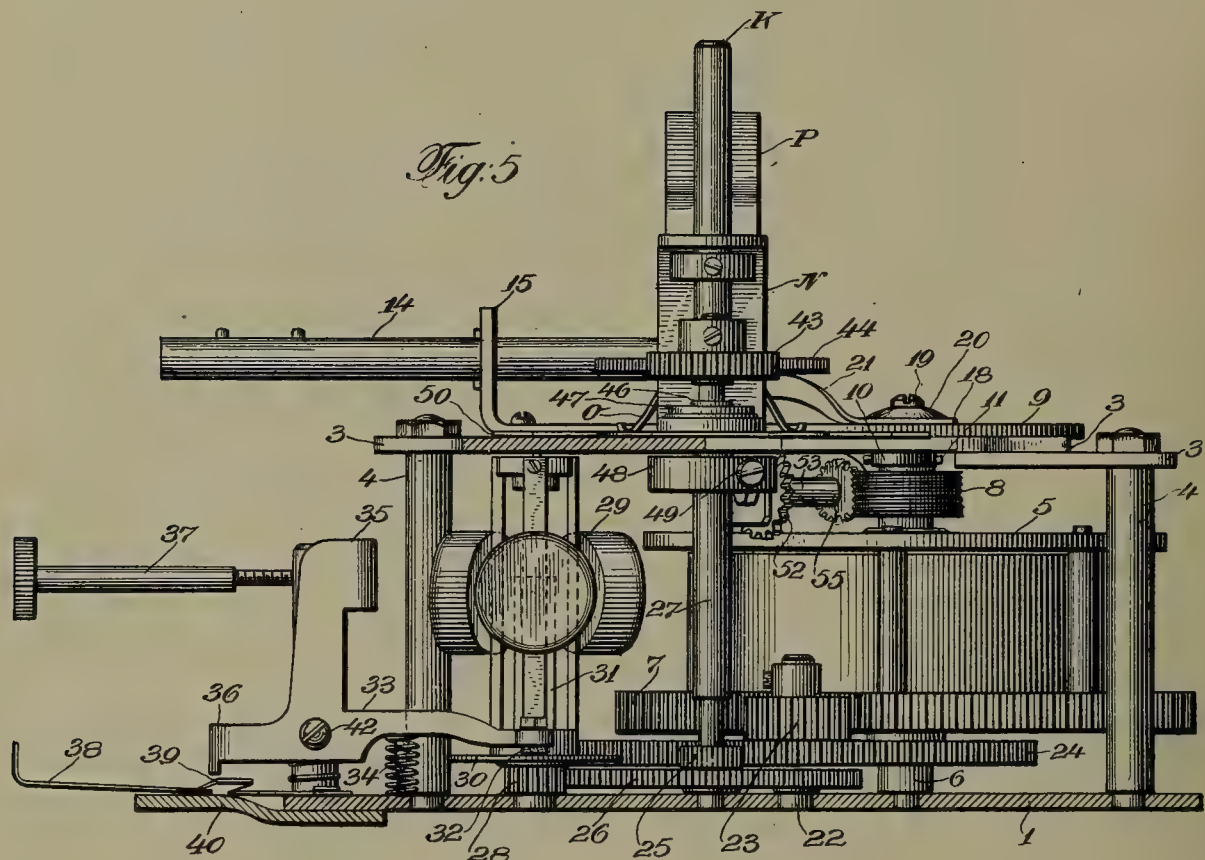
Edward F. Leeds and
George Rumpf Inventors
By their Attorney
Louis Hicks



E. F. LEEDS & G. RUMPF.
PHONOGRAPH.

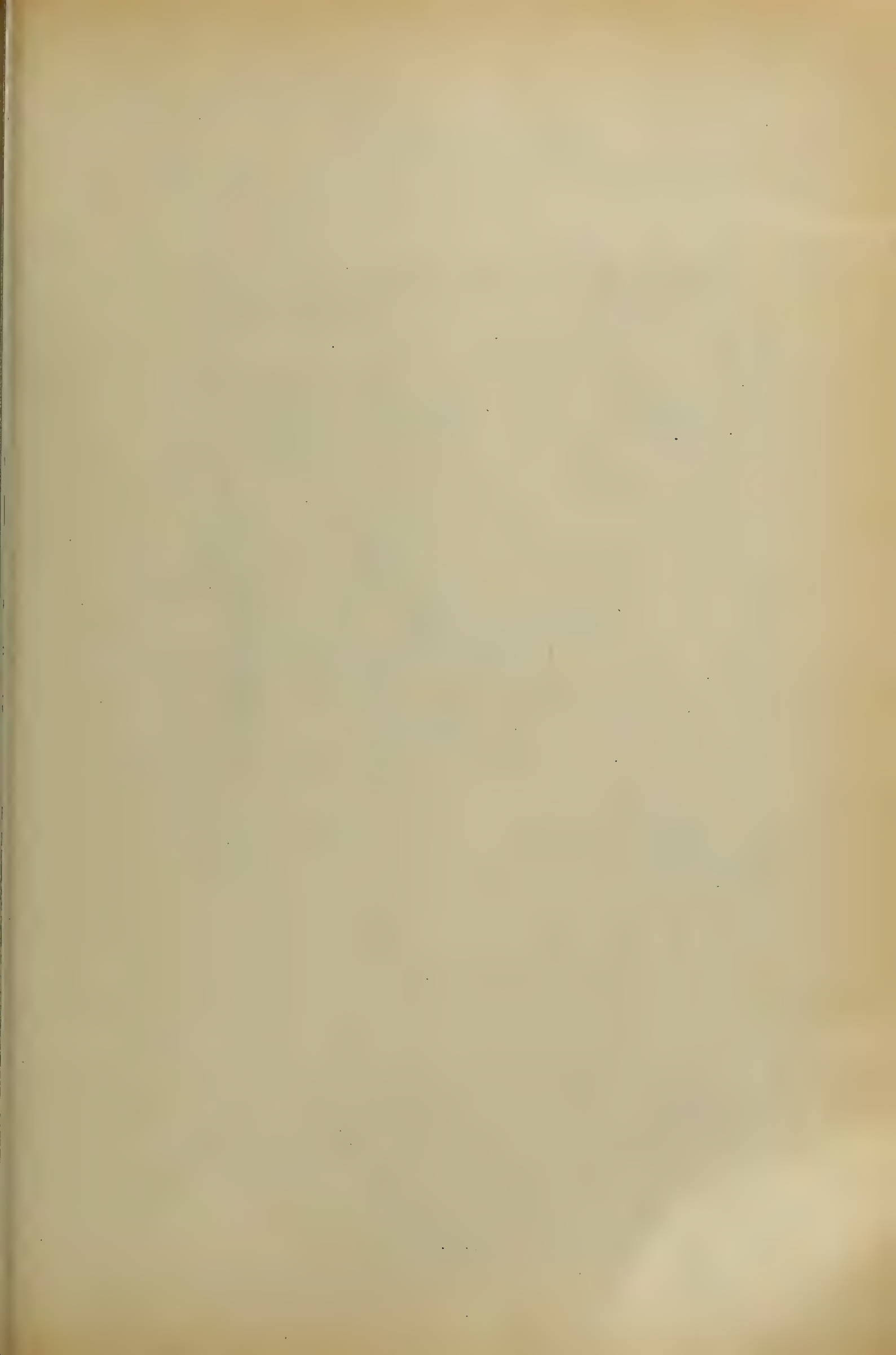
APPLICATION FILED JAN. 18, 1908.

5 SHEETS—SHEET 3.



Witnesses:
Harry Adams
Annie J. Irvine

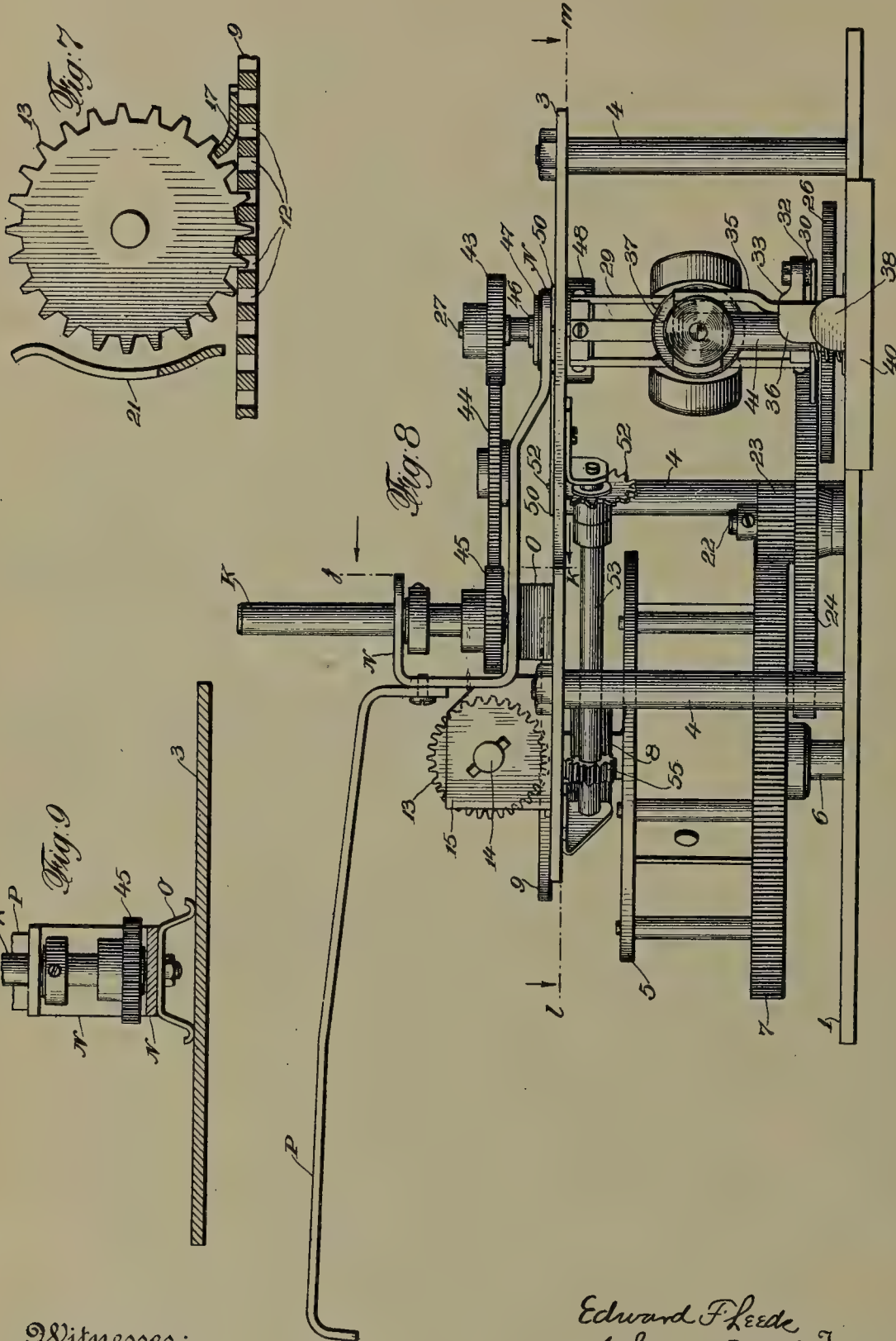
Edward F. Leeds and George Rumpf
Inventors
By their Attorneys *Louis Hicks*



E. F. LEEDS & G. RUMPF.
PHONOGRAPH.

APPLICATION FILED JAN. 18, 1908.

5 SHEETS—SHEET 4.



Witnesses:
Harry Adams
Annie J. Davis

Edward F. Leeds
and George Rumpf Inventors
By their Attorney *Louis Hicks*



No. 897,836.

PATENTED SEPT. 1, 1908.

E. F. LEEDS & G. RUMPF.
PHONOGRAPH.

APPLICATION FILED JAN. 18, 1908.

5 SHEETS—SHEET 5.

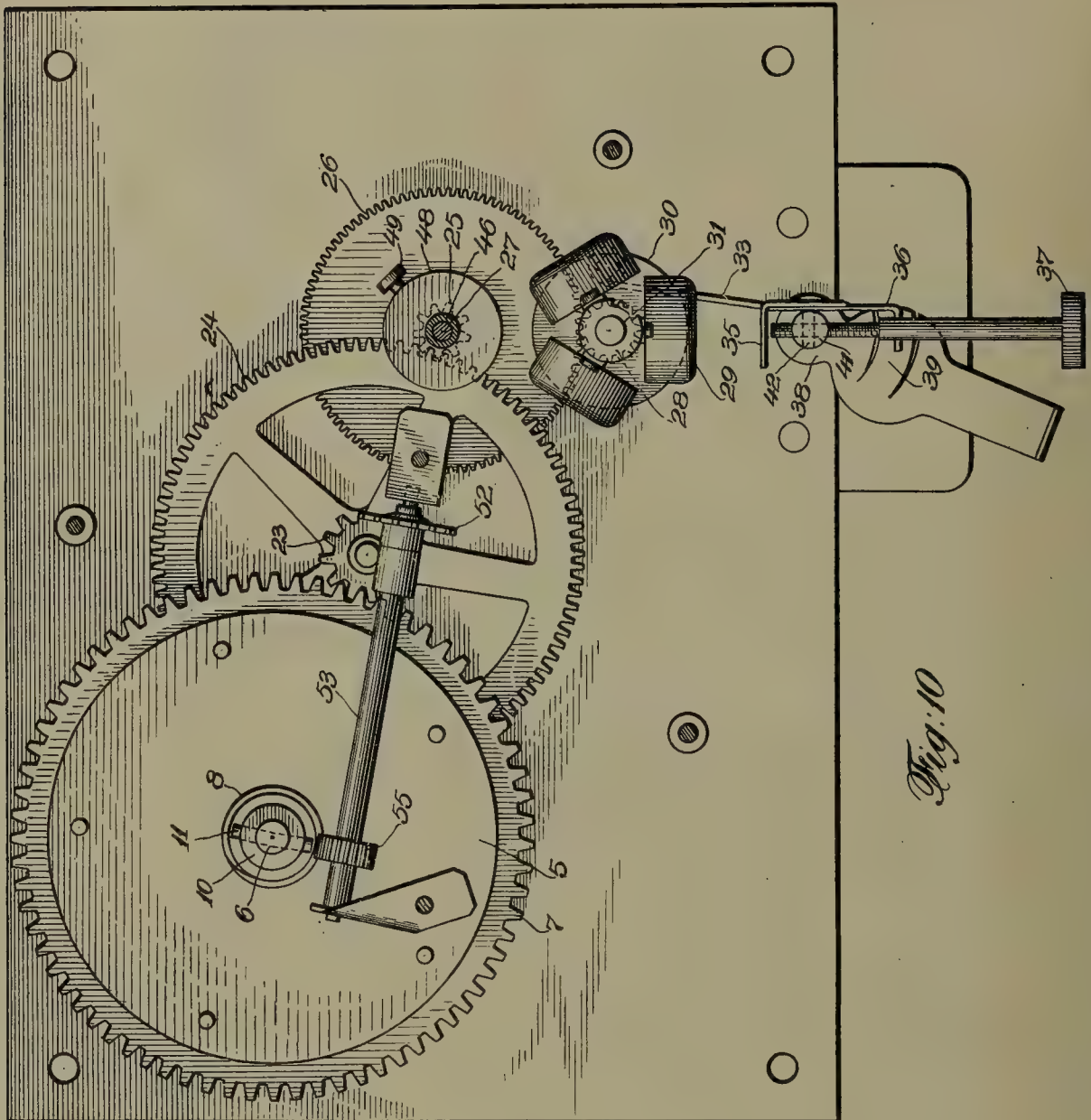


Fig. 10

Witnesses:
Harry Adams
Annie J. Swine.

Edward F. Leeds
and George Rumpf Inventors
By the Attorney *Louis Hicks*

UNITED STATES PATENT OFFICE.

EDWARD F. LEEDS AND GEORGE RUMPF, OF NEW YORK, N. Y.; SAID RUMPF ASSIGNOR TO SAID LEEDS.

PHONOGRAPH.

No. 897,836.

Specification of Letters Patent.

Patented Sept. 1, 1908.

Application filed January 18, 1908. Serial No. 411,425.

To all whom it may concern:

Be it known that we, EDWARD F. LEEDS and GEORGE RUMPF, citizens of the United States, residing, respectively, in the county of Kings and in the county of New York, city and State of New York, have invented new and useful Improvements in Phonographs, of which the following is a specification.

This invention relates to phonographs for recording and reproducing sound wherein the tablet of material suitable for recording sound, or the tablet having a sound-record made thereon, revolves and, at the same time, passes across and is fed to the point of the sound-recording or of the sound reproducing stylus by virtue of suitable mechanism, and has for its object the construction, in a cheap and practical manner, of a phonograph of the kind described embodying the improvements and advantages hereinafter described with reference to the drawings which form part of this specification.

Referring to the drawings, Figure 1 is a plan view, and Fig. 2 is an elevation, partly in vertical section, of a phonograph made in accordance with this invention. Fig. 3 is a plan view, partly in horizontal section along the line *ab*, of a detail of the phonograph shown in Fig. 2. Fig. 4 is a plan view of the mechanism within the box of the phonograph shown in Figs. 1 and 2. Fig. 5 is an elevation, partly in vertical section along the line *cd*, of mechanism shown in Fig. 4. Fig. 6 is an elevation, partly in vertical section along the line *ez*, of mechanism shown in Fig. 4. Fig. 7 is an elevation, partly in developing section along the line *gz*, of a detail of the mechanism shown in Fig. 4. Fig. 8 is an elevation of the mechanism shown in Fig. 4, viewed from the right side thereof. Fig. 9 is an elevation, partly in vertical section along the line *jz*, of a detail of the mechanism shown in Fig. 8. Fig. 10 is a plan view of that part of the mechanism shown in Fig. 8 which is below the line *lz*.

Referring to Figs. 1 and 2, A is a box, of any suitable shape and material, in which the greater part of the mechanism of the phonograph is preferably placed. B is a record-tablet, shown in the form of a disk having a sound-record made thereon. The record-tablet B may, however, consist of sound-recording material and be of any suitable shape

or size. C is a suitable support for the record-tablet B and may, as shown, consist of a disk of metal provided, preferably, with a covering D of felt or other suitable material upon its surface next to the tablet B. E is an arm secured to and extending from, one side of the box A. The arm E may be provided at its end with a cavity F, having recesses or sockets *f* and *f'*, as shown in Figs. 2 and 3. G is a bifurcated piece provided with two pins *p* and *p'*, entering and fitting respectively into the sockets *f* and *f'*, and with a pivot *g* upon which the bracket H, which supports the horn I, turns vertically. J is a sound-recorder or a sound-reproducer adjusted at the small end of the horn I and provided with a diaphragm and with a stylus *s* that vibrates vertically, or, as shown, that vibrates laterally in the recording and reproducing of sound. K is a revoluble shaft extending up through the top of the box A and carrying the metal plate C, together with the tablet B. L is an opening, oblong and slightly curved, as shown by dotted lines in Fig. 1, in the top of the box A to permit the to and fro, lateral or transverse motion of the revoluble shaft K, which, when it revolves, moves transversely and causes plate C and tablet B in like manner to revolve and to move transversely and thus to pass across the point of the sound-recording or of the sound-reproducing stylus. As hereinafter shown, the revoluble shaft K moves transversely in the arc of a circle.

The stylus *s* of the sound-box J is free to move up and down or vertically by virtue of the pivot *g* upon which the bracket H, which carries the horn I, turns. As shown in Figs. 1 and 2 the connection between the small end of horn I and sound-box J may consist of a rubber tube Q, the flexibility of which will permit stylus *s* to adjust itself automatically to the thread or groove of a sound-record and to gravitate to the bottom of the groove; or as shown in Figs. 2 and 3, the pin *p* need not quite fill the recess *f*, so that the part G is capable of a slight lateral motion by the turn of the pin *p'* in its socket *f'*, whereby the stylus *s* of the sound-box J is capable of such slight lateral motion as will enable it, in like manner, to adjust itself automatically to the thread or groove of a sound-record and gravitate to the bottom of the groove. Since the

threads or grooves of a sound-record approximate 100 to the inch, the lateral motion of the stylus *s*, permitted by lateral movement of the rubber tube *Q* or of the pin *p* in the recess *f*, necessary to permit the stylus to adjust itself automatically to the record-groove and to gravitate to the bottom thereof, is so slight that the stylus is, with regard to lateral motion, practically fixed or stationary.

The mechanism by virtue of which tablet *B*, resting upon plate *C* and revolving with shaft *K*, is permitted to pass across the point of stylus *s*, and in such manner that stylus *s* would, if tablet *B* did not revolve but moved only transversely, describe the arc of a circle in suitable recording material upon the surface of tablet *B*, is illustrated in the remaining Figs. 4-10 of the drawings and described as follows,—1 is a bed-plate provided with screw-holes 2 at the corners for the passage of screws to secure the bed-plate to the bottom of box *A*. 3 is a plate parallel to and elevated above bed-plate 1 and supported by three standards 4. In Fig. 8 plate 3 is shown as consisting of a single piece of metal, while in Figs. 4, 5 and 6 it is shown as consisting of two pieces, 3 and 3'. 5 is a casing containing a motor or main spring which is attached at one end to and winds about a vertical shaft 6. The casing 5 is provided with a gear-wheel 7 and a worm 8 which revolve with the casing under the action of the spring, as is well understood, and, respectively, communicate motion to the two principal, operative systems or parts of the machine. Attached to the upper end of shaft 6, above plate 3, is a wheel 9. The wheel 9 is provided on its lower side with a cylindrical piece or sleeve 10 which surrounds shaft 6, passing through plate 3, and engages a pin 11, which passes through shaft 6. The periphery of wheel 9 is provided with perforations 12, shown in Fig. 4, or with a crown gear or ring of vertical cogs instead of the perforations 12. The cogs or perforations 12 on the periphery of wheel 9 are engaged by gear-wheel 13 which revolves at the end of shaft 14. The shaft 14 revolves in bearings in the standards 15 and is provided with one or more projections 16 to engage a key adapted to enter the hole in the side of the box shown in Fig. 2 and turn or revolve shaft 14. When shaft 14 revolves, gear-wheel 13 revolves with it and causes the perforated or gear-wheel 9 to revolve, which, being connected with the main spring in the manner described, winds up the main spring.

In order to prevent the backward unwinding of the main spring, a stop 17, made of a flat piece of metal or in other suitable manner, is interposed between gear-wheel 13 and the perforations or cogs of wheel 9. The stop 17, as shown in the drawings, forms the end of one arm of a bifurcated, flat piece of

metal 18 which turns upon a pivot consisting, as shown, of a screw 19 entering the top of shaft 6. A washer 20, of metal or other suitable material, held down by screw 19, subjects the stop-piece or bifurcated piece of metal 18 to sufficient friction to cause it to revolve in either direction in which wheel 9 revolves.

In winding up the main spring in the manner above described, arm 21 of the bifurcated piece 18, by coming in contact with gear wheel 13, prevents the piece 18 from revolving or moving beyond a distance sufficient to carry stop 17 away from between wheel 13 and the perforations or cogs of wheel 9. Upon ceasing to wind up the main spring, the action of the main spring causes wheel 9 to begin to revolve in the opposite direction, carrying with it, by virtue of the friction described, the bifurcated piece 18, so that stop 17 returns to its position between gear-wheel 13 and the perforations or cogs of wheel 9, where it remains and prevents the backward unwinding of the main spring.

22 is a vertical shaft upon which two gear-wheels 23 and 24 revolve together. Gear-wheel 23 meshes with gear-wheel 7 and gear-wheel 24 meshes with gear-wheel 25, which revolves together with gear-wheel 26, causing vertical shaft 27 to revolve at the same time. Gear-wheel 26 meshes with gear-wheel 28 which causes governor 29, provided with disk 30, and vertical shaft 31 to revolve with it.

32 is a piece of leather or other suitable material carried by an arm 33 of a lever, the arm 33 being raised by the pressure of spring 34 or lowered by the movement of arm 35 or arm 36 of the lever-piece. Screw 42 in standard 41 forms the fulcrum for levers 35-33 and 36-33.

37 is a screw which turns in its bearing in standard 41 and may thus be brought to bear against arm 35 and lower the free end of arm 33.

38 is a flat piece of metal pivoted about the lower end of standard 41 and provided with a raised tongue 39 which, when brought in contact with arm 36, will also lower the free end of arm 33. The piece 38 moves over a slightly inclined piece of metal 40 which assists tongue 39 in elevating arm 36.

As is well understood, when the end of arm 33 is lowered and the piece of leather or other material 32 is brought to bear upon disk 30 of the governor 29, the speed of the revolving parts may be regulated as desired, or the motion of the parts may be stopped altogether. The screw 37 is used to regulate the machine so as to secure the desired, proper speed, while piece 38 is used in the ordinary starting and stopping of the machine in use for the recording or reproducing of sound.

Shaft 27, revolving as stated with gear-

wheels 25 and 26, extends above plate 3 and carries at its upper end gear-wheel 43 which revolves with it and meshes with gear-wheel 44, which in turn meshes with gear-wheel 45 carried by the lower end of shaft K. Thus shaft K revolves by virtue of motion communicated from shaft 27 through gear-wheels 43, 44 and 45, and with shaft K plate C and tablet B revolve as above described.

N is a carriage which may, as shown, be formed of a bent, suitable strip of metal. The carriage N is pivoted at one end by means of a collar or sleeve 46 surrounding shaft 27 and fitting, revolubly, in the perforation in plate 3 through which the upper part of shaft 27 passes. The collar 46 is provided with projecting rings 47 and 48 above and below plate 3, respectively, in order to maintain it and parts connected with it in proper position. The lower ring 48 is detachable and held fast by a set-screw 49.

The carriage N carries the pivot for gear-wheel 44 and bearings for revoluble shaft K. As clearly shown in Fig. 8, carriage N is so bent or formed that it is elevated above plate 3 except at the end where it is pivoted. At the opposite end of the lower part of carriage N and secured beneath it, a sliding-rest O is provided, adapted to rest upon and slide over the surface of plate 3 and to support the weight of carriage N and parts carried by it, including revoluble shaft K, plate C and tablet B. Sliding-rest O may, if desired, be provided with one or more rollers, resting upon the surface of plate 3, to lessen friction.

Between plate 3 and carriage N is a flat fan-shaped piece of metal 50 which is pivoted at one end and held in position in the manner above described for carriage N. The pivoted ends of carriage N and of piece 50 are suitably secured together, as by friction, as shown or by making carriage N and piece 50 of one piece of metal so that carriage N and piece 50 revolve or move together. Piece 50 should, preferably, be approximately in the shape of a sector of a circle and be revoluble about the center of the circle and should, near its circumference, be provided with perforations 51, or otherwise adapted as by cogs, forming a rack, to engage with gear-wheel 52 carried by one end of shaft 53 and projecting partially above plate 3 through perforation 54. The top of gear-wheel 52 acts as a laterally-moving feed-piece to communicate lateral motion to carriage N and parts connected and movable therewith. Shaft 53 carries at its other end gear-wheel 55 which meshes with worm 8. Thus as the main spring, motor or other suitable source of power causes worm 8 to revolve, motion is communicated, through gear-wheels 55 and 52 carried by shaft 53 to the revoluble, metal-piece 50 which carries with it, as it moves,

carriage N and parts carried by and movable with carriage N, all moving in arcs of circles having centers in shaft 27.

In the construction shown in the drawings the piece 50 moves from left to right, as viewed in Fig. 4, when motion is communicated thereto from the main spring. In order to secure the return to the starting point of piece 50 and parts moving therewith, carriage N is provided with a handle P and gear-wheel 52 is so mounted as to permit it to revolve on shaft 53 in one or both directions when shaft 53 is at rest or in motion and pressure is applied to a suitable point of wheel 52 for the purpose. In the construction shown in the drawings such revolution of wheel 52 is secured by mounting it upon shaft 53 in such manner that the friction at the bearing is sufficient to enable shaft 53 to cause wheel 52 to revolve with it and to impart motion to piece 50 and parts connected therewith but not sufficient to prevent the revolution of wheel 52 upon shaft 53 when pressure is applied in either direction by means of handle P which, operated by hand, communicates lateral motion to carriage N and piece 50 when and as desired.

From the foregoing description, the mode of operation of the phonograph, forming the subject matter of this invention, in recording and reproducing sound, will be readily understood. After winding up the main spring in the manner described, a record-tablet, provided with a surface of material suitable for making therein a record of sound, or a record-tablet having a sound record already made thereon, is placed upon plate C, shaft K passing through a hole at the center of the record-tablet. By means of handle P, shaft K is moved laterally to right or left with carriage N and connected parts in the manner described, until a desired, proper position of record-tablet B is obtained, which position may be one where stylus *s* will, upon being lowered, rest near the circumference of record-tablet B. If the record-tablet carries a record made thereon, stylus *s* will adjust itself to the record-groove. Screw 37 and metal piece 38 being properly adjusted as described, wheel 30 is relieved from the pressure of the piece of leather 32 carried by lever-arm 33 and the phonograph is set in motion by the action of the main spring. Record-tablet B thereupon revolves with the revolution of shaft K in the manner described and is simultaneously moved across and fed to the point of stylus *s* by reason of the lateral motion communicated to revolving shaft K through worm 8, shaft 53, wheel 52, carriage N and piece 50 with which carriage N is provided. If the record-tablet B employed was provided with a surface of suitable, recording material when the phonograph was set in motion and if sound-waves pass

through the horn I and impinge upon the diaphragm of sound-box J, stylus *s* will vibrate laterally or vertically, according to the form of sound-box employed, as is well understood, and will form in the recording material, a spiral groove of lateral or vertical undulations, constituting a sound-record. The spiral-groove constituting the sound-record may begin near the circumference and end near the center of the record-tablet B or may begin near the center and end near the circumference thereof or be otherwise formed as desired. If, on the other hand, the record-tablet B employed had a sound-record already made thereon when the phonograph was set in motion, stylus *s*, upon being lowered, will adjust itself to the record-groove and the lateral or vertical undulations of the record-groove will cause the stylus to vibrate and communicate its vibrations to the diaphragm of sound-box J and thus reproduce the sounds originally recorded.

As above stated, shaft K, in addition to revolving, moves laterally in the arc of a circle while the phonograph is in operation. The lateral motion in the arc of a circle to be communicated to revolving shaft K is determined by the lateral movement necessary to feed the revolving record-tablet B, provided with a surface of suitable, recording-material or having a sound-record made thereon, to the point of the stylus. In other words, at all times during one revolution of the recording-tablet B, shaft K is moved laterally in the arc of a circle a distance sufficient to feed the revolving, spiral record-groove of a sound-record continuously to the point of the stylus. This adjustment of the lateral movement of shaft K and of the spiral line of the record-groove is secured in a phonograph made according to this invention by the proper adjustment of the above mentioned parts, which communicate the lateral motion referred to from the main spring, and depends mainly, as will be well understood, upon wheel 55 and upon the relation existing between the circumferential rack, with which piece 50 is provided, and wheel 52. The extent of the required lateral movement of shaft K, during one revolution of record-tablet B, being determined with reference to the distance between adjacent parts or threads of a spiral record-groove, whether in reproducing sound from a given record or in recording sound by making a spiral record-groove, or, in other words, being determined by the pitch of the spiral line of the record-groove, the proper adjustment for the purpose of the necessary parts is readily made, as is well understood. Obviously, any adjustment employed in recording records of sound will be suitable for reproducing sound from a record made with that adjustment, but the adjustment should, preferably, be

such that in recording, for example, the surface of the recording material upon tablet B will be fed to stylus *s* so that in the spiral record-groove, when made, there will be approximately from 85-100 threads to the inch, measuring along a radius of a disk record-tablet.

The advantages of a phonograph made in accordance with this invention will be clear to those skilled in the art to which it appertains. By it there is obtained a practical sound-recording and sound-reproducing apparatus, which can be constructed at small cost and without difficulty. Moreover, in the reproduction of sound, by means of a phonograph embodying this invention, from sound-records, the record-groove passes across and is fed to the point of the stylus and the wear of the record caused in phonographs wherein the record-groove propels the stylus across the face of the record by means of the pressure exerted upon the stylus by the walls of the record-groove is obviated.

What we claim is;—

1. In a phonograph, the combination of a record-tablet, a revoluble shaft carrying the record-tablet, a pivoted carriage carrying the revoluble shaft, and a laterally-movable feed-piece to communicate lateral motion to the pivoted carriage and cause the revoluble shaft and record-tablet to be moved in arcs of circles, substantially as described.

2. In a phonograph, the combination of a stylus, a record-tablet, a revoluble shaft carrying the record-tablet, a pivoted carriage carrying the revoluble shaft, and a laterally-movable feed-piece to communicate lateral motion to the pivoted carriage and cause the revoluble shaft and record-tablet to be moved in arcs of circles, substantially as described.

3. In a phonograph, the combination of a stylus, a tablet having a sound-record formed thereon, a revoluble shaft carrying said tablet, a pivoted carriage carrying the revoluble shaft, and a laterally-movable feed-piece to communicate lateral motion to the pivoted carriage and cause the revoluble shaft and record-tablet to be moved in arcs of circles, substantially as described.

4. In a phonograph, the combination of a record-tablet, a revoluble shaft carrying the record-tablet, a pivoted carriage carrying the revoluble shaft and provided with rotatable wheels to revolve the shaft, and a laterally-movable feed-piece to communicate lateral motion to the pivoted carriage and cause the revoluble shaft and record-tablet to be moved in arcs of circles, substantially as described.

5. In a phonograph, the combination of a revoluble shaft, a pivoted carriage bearing the shaft, a plate and a sliding-rest attached to the carriage and touching the surface of the plate, substantially as described.

6. In a phonograph, the combination of a

revoluble shaft, a pivoted carriage bearing the shaft and rotatable parts to revolve the shaft, a plate and a sliding-rest attached to the carriage and touching the surface of the plate, substantially as described.

7. In a phonograph, the combination of a revoluble shaft, a pivoted carriage bearing the shaft, a pivoted piece provided with a rack, and a revoluble gear-wheel meshing with the rack, substantially as described.

8. In a phonograph, the combination of a revoluble shaft, a pivoted carriage bearing the shaft and a revoluble wheel bearing, at points in the arc of a circle, upon a rack with which the pivoted carriage is provided, substantially as described.

9. In a phonograph, the combination of a revoluble shaft, a pivoted carriage bearing the shaft, a wheel revoluble in both directions bearing upon a rack with which the pivoted carriage is provided and a handle to move the carriage upon its pivot, substantially as described.

10. In a phonograph, the combination of a motor, a revoluble, stationary shaft receiving motion from the motor, a carriage pivoted about said shaft, and a revoluble shaft mounted on the pivoted carriage and receiving motion from the stationary shaft, substantially as described.

11. In a phonograph, the combination of a motor, a revoluble, stationary shaft receiving motion from the motor, a pivoted carriage, a revoluble shaft mounted on the pivoted carriage and receiving motion from the stationary shaft, and a revoluble wheel receiving motion from the motor and imparting another motion to the carriage about its pivot, substantially as described.

12. In a phonograph, the combination of a motor, a worm, a pivoted rack, a shaft provided with two wheels, one of which is in contact with the worm and the other of which is in contact with the pivoted rack, and a pivoted carriage revoluble by the rack, substantially as described.

13. In a phonograph, a pivoted carriage provided with a revoluble shaft and a sliding-rest, substantially as described.

14. In a phonograph, a pivoted carriage provided with a revoluble shaft, a sliding-rest and a handle, substantially as described.

15. In a phonograph, the combination of a plate, a motor below the plate, a stationary, revoluble shaft receiving motion from the motor below the plate and passing through the plate, and a pivoted carriage above the plate provided with a revoluble shaft receiving motion from the stationary shaft, substantially as described.

16. In a phonograph, the combination of a plate and below the plate a worm and shaft provided with two wheels, one of which is in contact with the worm, and above the plate a

pivoted carriage provided with a revoluble shaft, and a rack in contact with one of the wheels carried by said shaft below the plate, substantially as described.

17. In a phonograph, the combination of a revoluble shaft, a revoluble record-tablet receiving motion from the shaft, a rack secured to the shaft, a wheel in contact with the rack and a stop-piece interposed between the wheel and rack, substantially as described.

18. In a phonograph, the combination of a revoluble shaft, a revoluble record-tablet receiving motion from the shaft, a rack carried by the shaft, a wheel in contact with the rack and a bifurcated stop-piece, one arm of which is interposed between the wheel and rack and the other arm of which extends to one side of the wheel, substantially as described.

19. In a phonograph, the combination of a revoluble shaft, a revoluble record-tablet receiving motion from the shaft, a rack carried by the shaft, a wheel in contact with the rack and a stop-piece pivoted about the shaft and interposed between the wheel and rack, substantially as described.

20. In a phonograph, the combination of a revoluble shaft, a revoluble record-tablet receiving motion from the shaft, a rack carried by the shaft, a wheel in contact with the rack and a pivoted stop-piece, of which the pivoted end is in frictional connection with the rack and revoluble therewith and of which the free end is interposed between the wheel and rack, substantially as described.

21. In a phonograph, the combination of a revoluble shaft, a revoluble record-tablet receiving motion from the shaft, a rack carried by the shaft, a wheel in contact with the rack and a pivoted, bifurcated stop-piece, of which the pivoted end is in frictional connection with the rack and revoluble therewith and of which one arm is interposed between the wheel and rack while the other arm extends to one side of the wheel, substantially as described.

22. In a phonograph, the combination of a pivoted carriage provided with a revoluble shaft and with a rack, and a wheel engaging the rack and revoluble by pressure exerted through the rack, substantially as described.

23. In a phonograph, the combination of a record-tablet, a revoluble shaft, a pivoted carriage bearing the shaft, a laterally movable feed-piece to communicate lateral motion to the pivoted carriage and cause the revoluble shaft and record-tablet to be moved in arcs of circles, a stylus and a mounting for the stylus which permits a slight lateral movement of the stylus and thereby an adjustment of the stylus to a record-groove, substantially as described.

24. In a phonograph, the combination of a record-tablet, a revoluble shaft, a pivoted carriage bearing the shaft, a laterally movable feed-piece to communicate lateral mo-

tion to the pivoted carriage and cause the rev-
oluble shaft and record-tablet to be moved
in arcs of circles, a sound-box provided with
a stylus, and a flexible tube connected with
5 the sound-box which permits a slight lateral
motion of the stylus and thereby an adjust-
ment of the stylus to a record-groove, sub-
stantially as described.

In witness whereof we have hereunto set
our hands this 15th day of January, 1908. 10

EDWARD F. LEEDS.
GEORGE RUMPF.

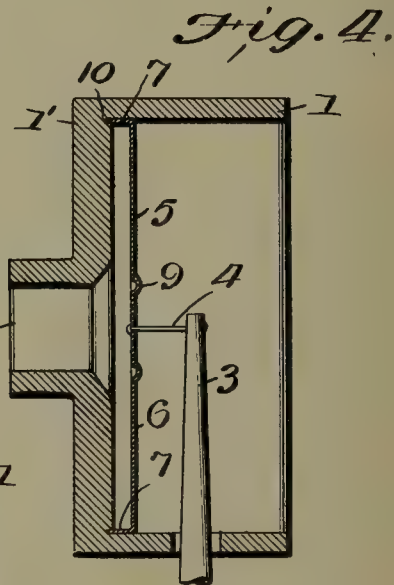
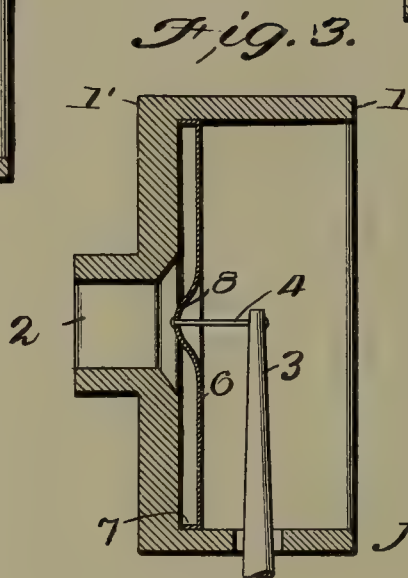
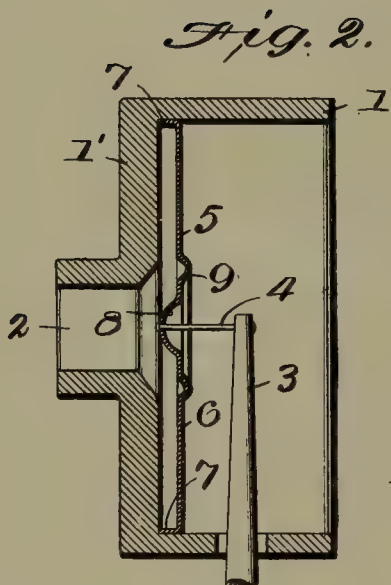
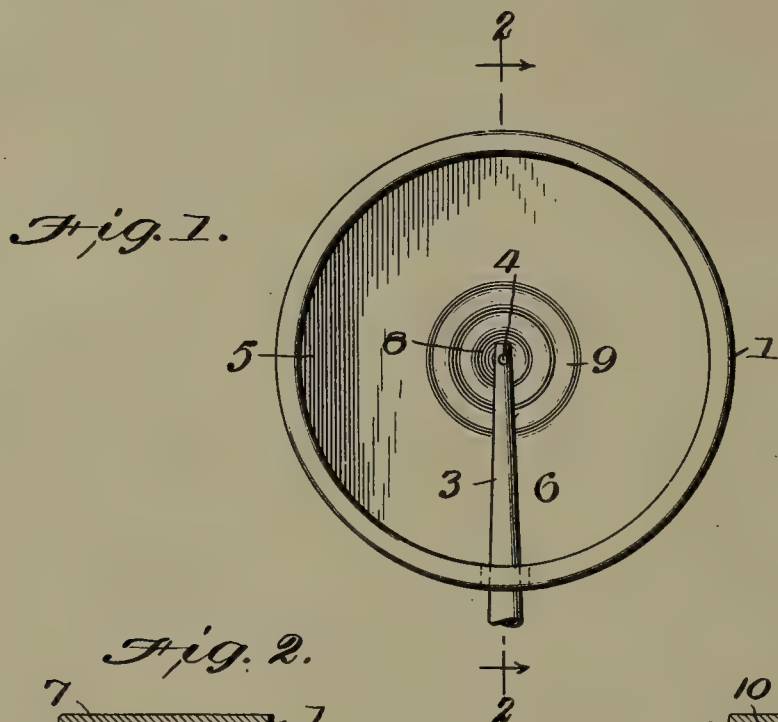
Witnesses:

LEO MOELLER,
JOS. ISAAC.

J. C. ENGLISH.

SOUND BOX FOR MACHINES FOR RECORDING AND REPRODUCING SOUND.

APPLICATION FILED MAR. 27, 1908.



Witnesses
F. E. Barry
Walter A. Holden

Inventor
John C. English
 By *Horace Peltz*
 Attorney

UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX FOR MACHINES FOR RECORDING AND REPRODUCING SOUND.

No. 898,201.

Specification of Letters Patent.

Patented Sept. 8, 1908.

Application filed March 27, 1906. Serial No. 308,224.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes for Machines for Recording and Reproducing Sound, of which the following is a full, clear, and complete disclosure.

My invention relates to the sound box for use in machines for recording and reproducing sound and particularly to the diaphragm of such sound boxes and to the means for positioning or adjusting, and for securing the same within the sound box.

The object of my invention is to provide a diaphragm for a sound box in which no special care or skill is required to accurately position or adjust the diaphragm in its proper position within the sound box and to secure the diaphragm in such adjusted position without the use of gaskets or elastic rings or similar means.

A further object of my invention is to construct a diaphragm of such a shape that the same is not liable to become distorted and subjected to unevenly distributed strains when placed within the sound box, but to stiffen the same both at the edges or periphery and also at the center thereof in order to more accurately and faithfully transmit the vibrations of sound or speech, and to improve the quality and quantity of the sound or speech reproduced from a recording surface.

Further objects of my invention will appear in the following specification and claims.

In the drawings accompanying this specification and forming a part thereof, Figure 1 is an end view of a sound box provided with my improved diaphragm; Fig. 2 is a transverse longitudinal section thereof on the line 2—2 of Fig. 1; Fig. 3 is a similar sectional view of a modified form of diaphragm and Fig. 4 is also a longitudinal sectional view of a modified form of the diaphragm and of the manner of securing the same within the sound box.

Similar numerals in the different figures represent corresponding parts.

1 indicates a sound box of any suitable type provided on its back side with a short sound conveying tube 2 by which it may be secured in a suitable manner to the swinging

sound conveying tube of a sound recording or reproducing machine.

3 represents the upper end of a stylus bar of any suitable description and 4 the connection between the stylus bar and the diaphragm.

The diaphragm 5 consists of a disk 6 provided with an integral cylindrical flange 7 extending from the periphery of said disk normal to the plane of the diaphragm. The diaphragm may be described as being in the form of a shallow cup shaped body having cylindrical sides. I may make this diaphragm of any suitable metal, such as steel, phosphor bronze or German silver and I may form the same either by the use of dies, or by spinning the edges of a planchet or disk to form the cylindrical flanges. The diaphragm so formed is inserted within the inner bore of the sound box so that the edge of the flange or side of the cup shaped body rests against the back 1' of said sound box, the outer diameter of the said cylindrical flange fitting snugly within said sound box and holding the diaphragm securely in position. In order, however, to make sure that there will be no space between the outer surface of the flange 7 and the inner surface of the sound box which might result in the production of undesirable sounds due to the vibrations of the flange and its consequent intermittent contact with the walls of the sound box, I may place a small quantity of suitable cement within the sound box and adjacent the back wall 1' thereof before the diaphragm is pressed down into position within the sound box.

A diaphragm made, in the manner described, is not liable to become distorted or lose its shape either before or after it is placed within the sound box, the cylindrical flange operating to stiffen the edge of the same in addition to forming a sufficient surface by which the diaphragm may be retained within the sound box.

By accurately determining the depth of flange 7, the proper distance between the disk like portion 6 of the diaphragm and the back 1' of the sound box may be made uniform and of a distance found by actual experiment to be suited for the production of the best results. No special care need be taken in assembling the sound box to adjust

the plane of surface of the diaphragm at the proper distance from the back of the sound box since the flange 7 of itself by its contact with the back of the sound box determines the said distance.

The diaphragm may be provided with a stiffened center by pressing or spinning the depressed portion 8 at the center thereof. Said depressed portion preferably extends in a direction away from the end of the stylus bar in order that the connection 4 may be made as long as possible to secure elasticity in the same. Such a diaphragm is shown in Figs. 2 and 3. I may, moreover, stiffen the center of the diaphragm by pressing or spinning concentric rings 9 in the body of the diaphragm, thus rendering the diaphragm insensible to those vibrations which are not true harmonic curves and are caused by the inaccurate action of the stylus bar and to the frictional contact between the bottom or sides of the sound groove and the stylus.

In order to obtain a firmer and more rigid connection between the flange of the diaphragm and the sound box, I may provide the back of the sound box with a circular channel 10 and within which the flange 7 accurately fits, as plainly shown in Fig. 4, and a suitable cement may be placed in said groove or on the adjacent surface of the sound box before the diaphragm is inserted.

I am aware that attempts have been made to use diaphragms with concentric rings adjacent to the outer periphery for stiffening the outer edge and also that metallic diaphragms have been made having concentric rings above and below the central line or axis thereof for the purpose of giving amplitude to the center of the diaphragm and that later in order to produce the best results, it has been found necessary to stiffen the center of the diaphragm instead of making the center highly elastic. I have found, however, that by providing the diaphragm with a stiffening flange at the periphery thereof and by making such flange of a sufficient depth to accurately position the disk like portion of the diaphragm in the back of the sound box and for securing and retaining contact between the outer cylindrical surface of the said flange and the inside of said sound box, that a diaphragm so produced, transmits vibrations more accurately and faithfully than any of the forms above referred to and moreover, enables me to dispense entirely with the usual gaskets or retaining rings formed of rubber or other changeable or perishable material. In this way sound boxes may be produced with substantially uniform recording and reproducing qualities and without parts which are liable to deteriorate.

While I have described one way in which my invention may be put into effect, I do not wish to be confined to the exact form or arrangement of parts, since my invention con-

sists broadly of providing any diaphragm with an integral peripheral stiffening flange.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent of the United States, is:—

1. In a sound recording and reproducing machine, the combination with a sound box, of a diaphragm provided with an integral cylindrical flange the said diaphragm being retained in said sound box by the engagement between said flange and said sound box and having the end of said flange engaging the rear wall of said sound box.

2. In a sound box having a cylindrical bore, and a circular channel opening into said bore, a diaphragm provided with a cylindrical flange at the periphery thereof tightly fitting within said bore and extending into said channel.

3. In a sound box having a cylindrical bore, and a circular channel opening into said bore and concentric therewith, a diaphragm provided with a cylindrical flange at the periphery thereof tightly fitting within said bore and filling said channel.

4. In a sound box the combination with that part of sound box provided with a sound conveying opening and having a circular channel concentric therewith, of a diaphragm provided with a cylindrical flange fitting tightly within said channel.

5. In a sound box having a groove with side walls extending longitudinally of the box, a diaphragm having a flange at its periphery fitting tightly within said groove.

6. In a sound box provided with a bore, a groove in said bore, a diaphragm having a flange inclined to the plane of the diaphragm and fitting tightly within said groove.

7. In a bored sound box provided with a bore, a groove in said bore, a diaphragm having a flange inclined to the plane of the diaphragm and fitting tightly within said groove, the inclined side of said flange fitting tightly within the bore of said box.

8. In a sound box, the combination with a casing having a cylindrical bore therein, said bore opening in the face of said casing, of a diaphragm provided with a cylindrical flange at the periphery thereof snugly fitting within said bore.

9. In a sound box, the combination with a casing having a cylindrical bore opening in the face thereof, of a diaphragm provided with an inwardly extending cylindrical flange at the periphery thereof snugly fitting within said bore, the inner edge of said flange being in contact with the back of said casing.

10. In a sound box, the combination with a casing having a cylindrical bore, of a diaphragm provided with an inwardly extending cylindrical flange at the periphery thereof snugly fitting within said bore, the inner edge of said flange being in contact with a portion of said casing.

11. In a sound box, the combination with a casing having a bore opening in the face thereof, of a diaphragm having a flanged edge fitting snugly within said bore.

5 12. In a sound box, the combination with a casing having a bore opening in the face thereof, of a diaphragm having an inwardly flanged edge snugly fitting within said bore, the inner edge of said flanged edge being in
10 contact with a portion of said casing.

13. In a sound box, the combination with a hollow casing, of a diaphragm having a flanged edge fitting snugly within said casing, and a stylus bar phonetically connected
15 to said diaphragm, said diaphragm being unrestrained between said flanged edge and the point of connection with said stylus bar.

14. In a sound box, the combination with a casing having a cylindrical bore, of a dia-
20 phragm having a cylindrical flange integral therewith at the edge thereof fitting snugly within said bore and a stylus bar phonetically connected to said diaphragm, said diaphragm being unrestrained between said

flanged edge and the point of connection with 25 said stylus bar.

15. In a sound box, the combination with a casing having a cylindrical bore, of a diaphragm having a cylindrical flange at the periphery thereof fitting snugly in said bore, 30 said diaphragm being in contact with a portion of said casing extending inwardly from the cylindrical surface of said bore to position said diaphragm.

16. In a sound box, the combination with 35 a casing having a bore opening in the face thereof, of means carried by said diaphragm and extending laterally therefrom for holding said diaphragm snugly in position in said bore. 40

In witness whereof, I have hereunto set my hand this twenty-sixth day of March, A. D. 1906.

JOHN C. ENGLISH.

Witnesses:

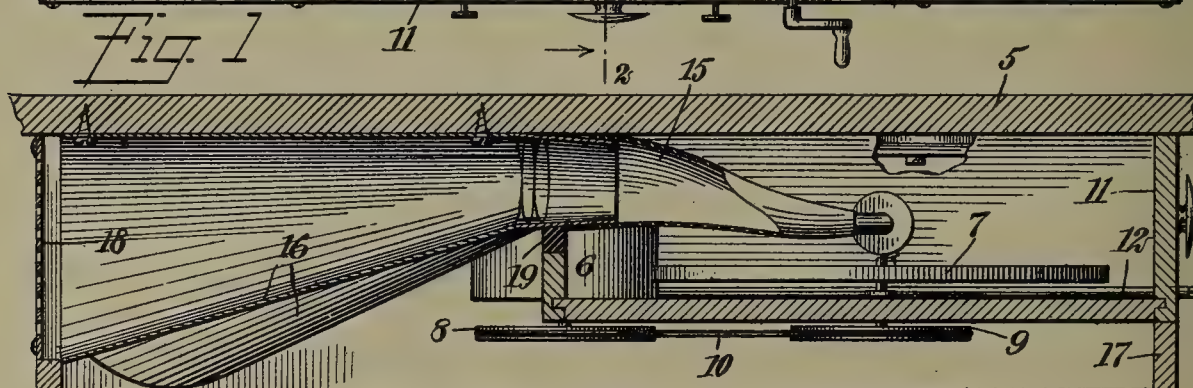
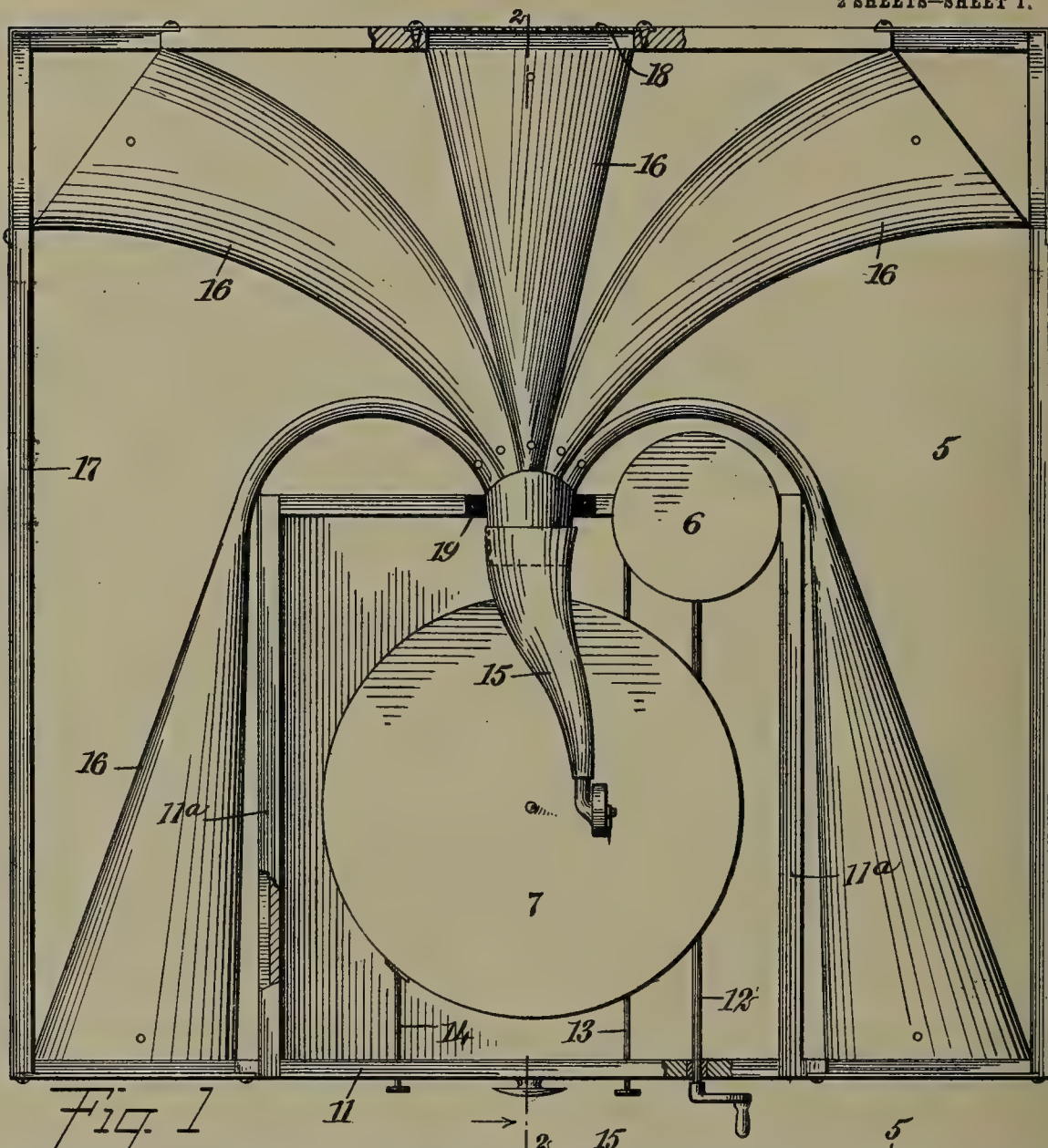
ALEXANDER PARK,
ALSTON B. MOULTON.

J. SCHWAN.
SOUND REPRODUCING MACHINE.
APPLICATION FILED AUG. 20, 1907.

898,791.

Patented Sept. 15, 1908.

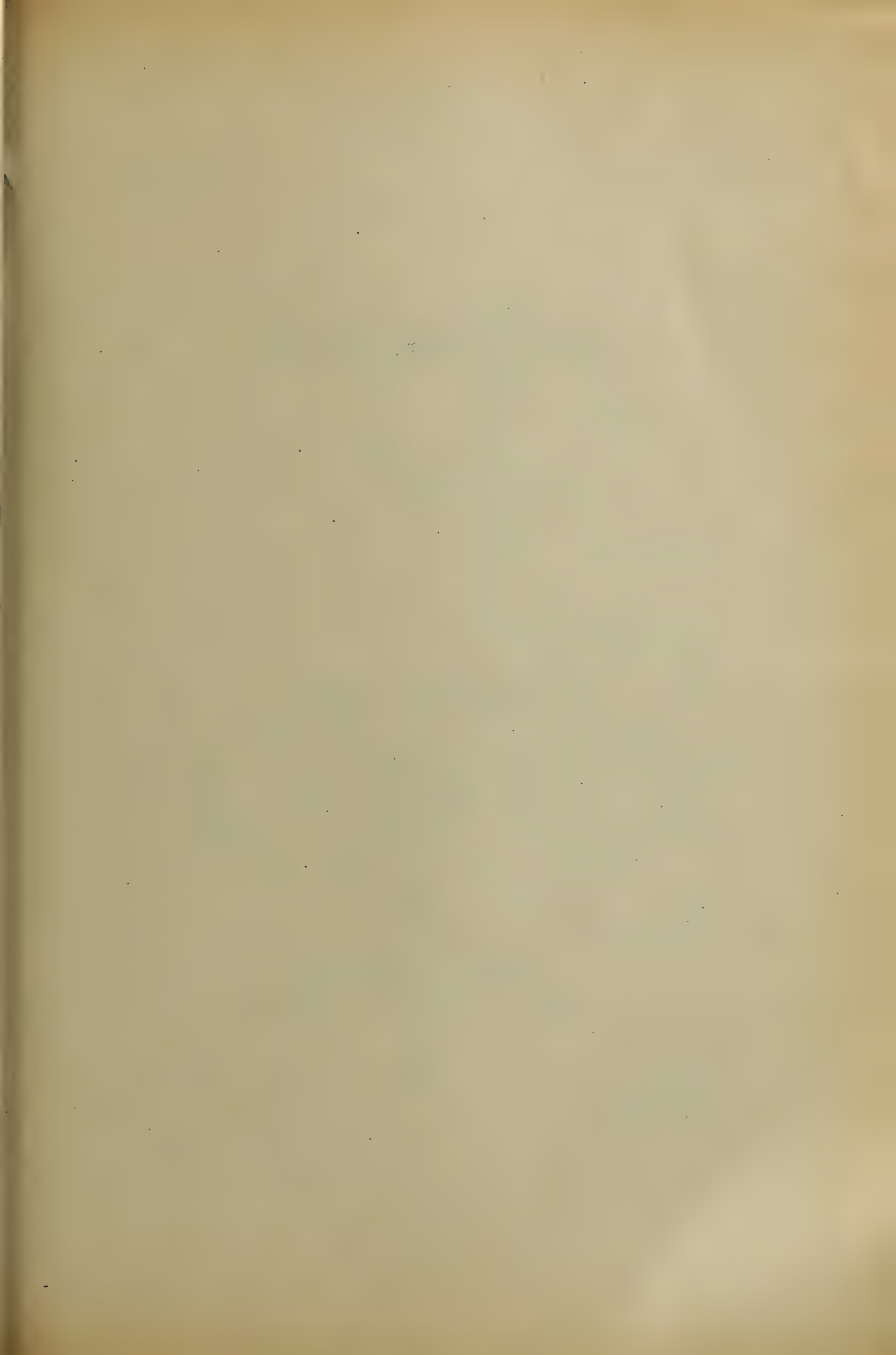
2 SHEETS—SHEET 1.



WITNESSES
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W. W. Scher

Fig. 2

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BY Mumm Co
ATTORNEYS



J. SCHWAN.
SOUND REPRODUCING MACHINE.
APPLICATION FILED AUG. 20, 1907.

898,791.

Patented Sept. 15, 1908.

2 SHEETS—SHEET 2.

Fig. 3

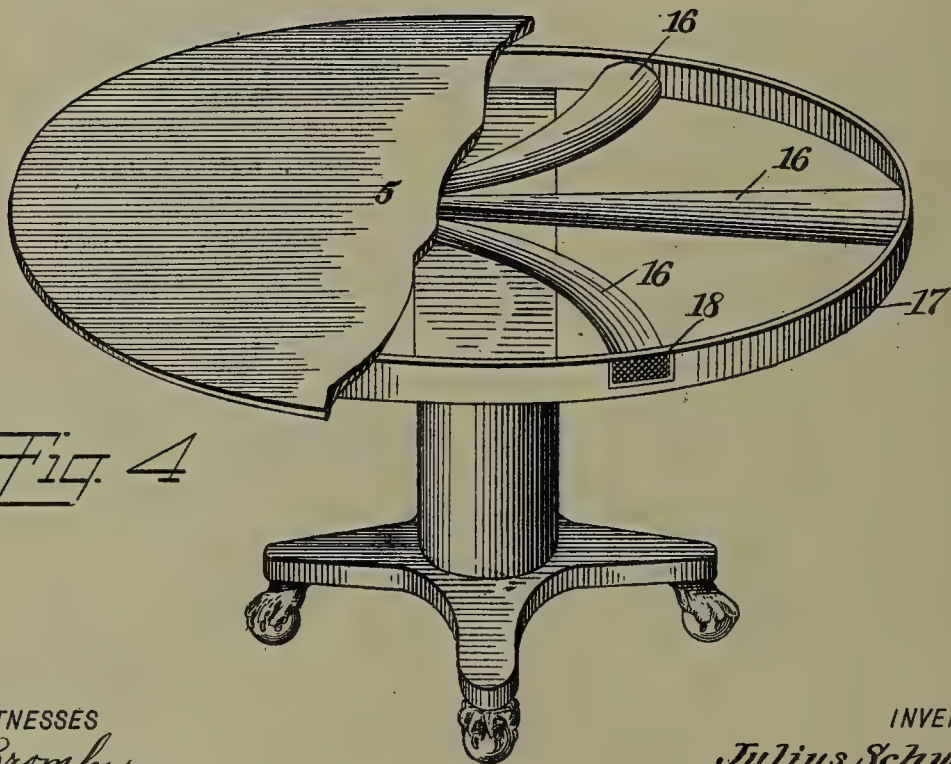
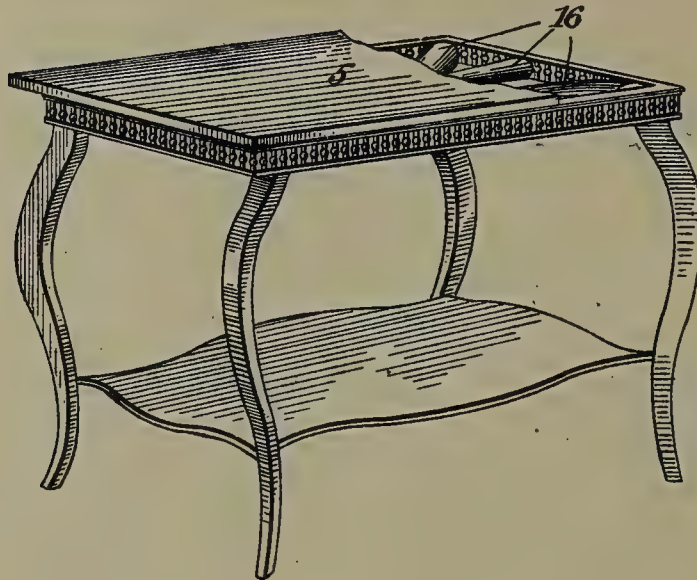


Fig. 4

WITNESSES
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UNITED STATES PATENT OFFICE.

JULIUS SCHWAN, OF NEW YORK, N. Y.

SOUND-REPRODUCING MACHINE.

No. 898,791.

Specification of Letters Patent.

Patented Sept. 15, 1908.

Application filed August 20, 1907. Serial No. 389,386.

To all whom it may concern:

Be it known that I, JULIUS SCHWAN, a citizen of the United States, and a resident of the city of New York, borough of the Bronx, in the county and State of New York, have invented new and useful Improvements in Sound-Reproducing Machines, of which the following is a full, clear, and exact description.

10 This invention is an improvement in sound reproducing machines, relating more especially to the arrangement of such devices whereby they will at all times occupy a concealed and removed position. With this in
15 view I construct the machine as a permanent part of a support having a flat top and in the nature of a table, and movably support the machine casing below the top. The support is provided with a number of horns radiating
20 to its border and connecting with the horn of the machine, which serve to uniformly distribute the sound waves throughout the room. By this arrangement it is apparent that the ordinary use of the support as a
25 table is not impaired, and the machine, which is to many an unsightly object, is concealed and protected from the dust.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference
30 indicate corresponding parts in all the views.

Figure 1 is a plan of a support in the form of a library table with the top removed, having one embodiment of my improvement
35 applied thereto; Fig. 2 is a cross-section of the same on the line 2—2 of Fig. 1; Fig. 3 is a perspective view of the support shown in Fig. 1, with the top partly broken away showing the position of the radiating horns; and Fig.
40 4 is a like view of the invention applied to a round-top support in the form of a dining table.

In connection with a flat-top support in the nature of a library table or dining table 5,
45 I make as a permanent part thereof any ordinary or other preferred form of sound reproducing machine, that shown consisting of a motor 6 which drives the record holder 7 through the intermediary of pulleys 8 and 9,
50 respectively carried by the motor and holder and connected together by a belt 10, said belt and pulleys being arranged at the bottom of the machine casing, which, as shown, is in the form of a drawer 11 having flanges
55 11^a at its top edges slidable inwise directly

underneath the flat top. This precise manner of movably mounting the drawer is, however, not material, as it is only essential to my invention that the drawer be movably supported directly under the top and closely
60 adjacent thereto. The machine further includes a winding stem 12 and a starter 13 for the motor, as well as a stopping device 14, all of which pass through the front of the casing where they are provided with suitable
65 devices for their convenient operation.

The horn 15 of the machine is preferably directed to the back of the casing and is supported in any suitable manner in alinement with the neck of a series of radiating horns
70 16, which are substantially horizontally disposed and lead to the depending marginal flange 17 of the support, where openings are provided covered with ornamental perforated plates 18; this construction obviously oper-
75 ating to substantially uniformly distribute the sound waves about the room. As shown, the horn 15 telescopes with the neck of the radiating horns, which is received within an opening formed in the rear of the drawer, and
80 is insulated by a ring of rubber or other like material 19 in order that the resonance of the horns may not be impaired.

The arrangement and construction provide for the convenient access to the machine and
85 its operation without impairing the ordinary use of the support, and the talking machine, which is to many an unsightly object, is removed from view as well as protected from
90 dust.

While I have illustrated the preferred construction and arrangement of my invention, it is apparent that various immaterial changes may be resorted to within the scope of the invention as defined in the claims
95 annexed.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In combination with a support having
100 a flat top, a sound reproducing machine having a casing supported from and movably mounted directly under said top.

2. In combination with a support having a top provided with a depending marginal
105 flange, a horn fixed directly beneath said top leading to an opening in said depending marginal flange, and a sound reproducing machine having a casing movably supported
under the top and provided with a horn adapt- 110

ed to telescope with the first mentioned horn when the casing is disposed in normal operative position.

3. In combination with a support having
5 a top provided with a depending marginal flange having openings therein, radiating horns laterally disposed directly beneath said top leading to said openings and having a common neck, and a sound reproducing
10 machine located under said top having a horn adapted to telescope with the neck of said radiating horns when in operative position.

4. In combination with a support having
15 a flat extended top provided with a depending marginal flange having openings therein, a series of radiating horns fixed directly beneath the top of the support and connecting with said openings, and a sound reproducing
20 machine located directly under the top of the support at substantially the same elevation as the said horns and connected therewith.

5. In combination with a support having
25 a flat top provided with a depending marginal flange having openings therein, a series of radiating horns substantially horizontally disposed and secured directly beneath said top and leading to said openings, perforated
30 plates covering said openings, and a sound reproducing machine concealed under the top of the support at substantially the same elevation as the radiating horns and connected therewith.

35 6. In combination with a support having a flat top, a sound reproducing machine having a casing slidably supported from and arranged directly under said top.

40 7. In combination with a support having a flat top provided with a depending marginal flange, a sound reproducing machine having a casing slidably supported directly under said top with one side of the casing

forming a continuation of said flange when the casing is in operative position. 45

8. In combination with a support having a flat top provided with a depending marginal flange, a sound reproducing machine having a casing located directly under said top with one side of the casing forming a con- 50 tinuation of said flange when the casing is in operative position, and means for controlling the machine passing through that portion of the casing forming a part of the flange. 55

9. In combination with a support having a top, a sound reproducing mechanism having a casing supported from and movably mounted under the top, and including means for winding, starting and stopping said 60 mechanism passing through the front of the casing.

10. In combination with a support having a top, a horn secured directly under said top, and a sound reproducing machine having a 65 casing movably mounted under said top and including a horn adapted to telescope with the first mentioned horn when the casing is moved to operative position.

11. In combination with a support having 70 a top, a horn secured beneath said top, a sound reproducing machine having a casing movably mounted under said top and including a horn adapted to telescope with the first mentioned horn when the casing is in 75 operative position, and means for insulating that portion of one of said horns which passes through the casing.

In testimony whereof I have signed my name to this specification in the presence of 80 two subscribing witnesses.

JULIUS SCHWAN.

Witnesses:

W. W. HOLT,
JOHN P. DAVIS.

C. W. SCHWANK.
DISK RECORD ATTACHMENT FOR SOUND REPRODUCING MACHINES.
APPLICATION FILED MAR. 10, 1908.

898,792.

Patented Sept. 15, 1908.

2 SHEETS—SHEET 1.

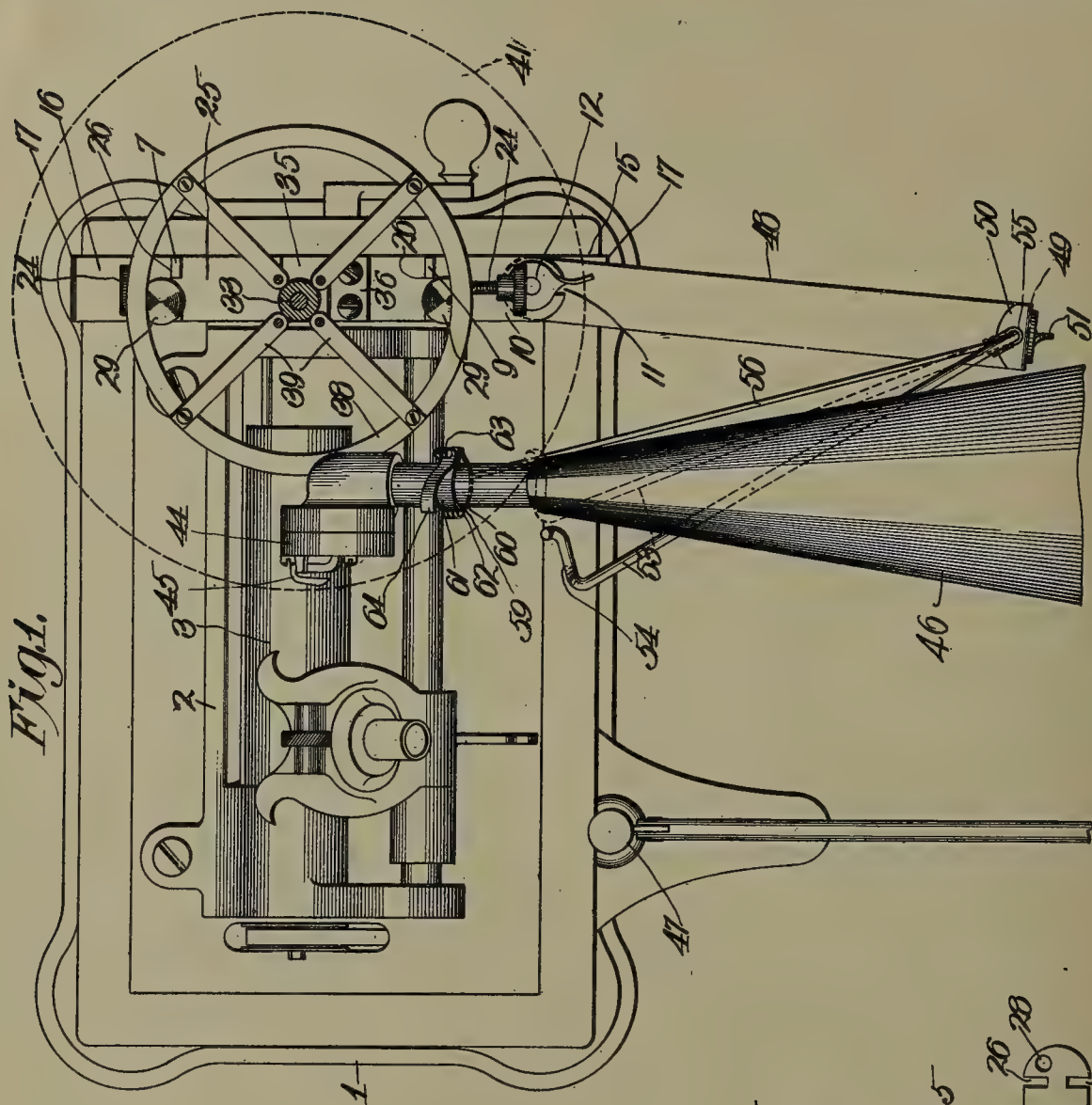


Fig. 3.

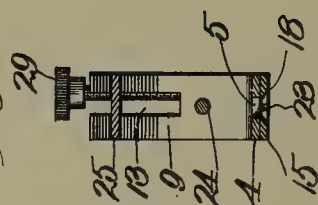


Fig. 4.

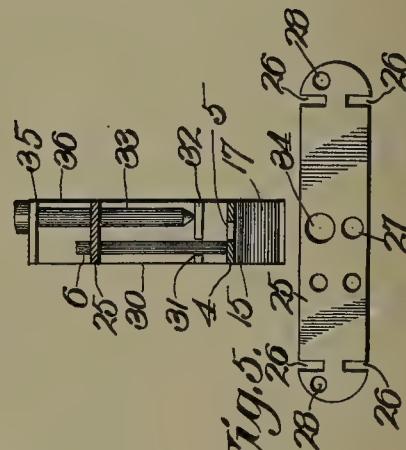
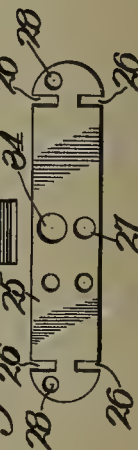
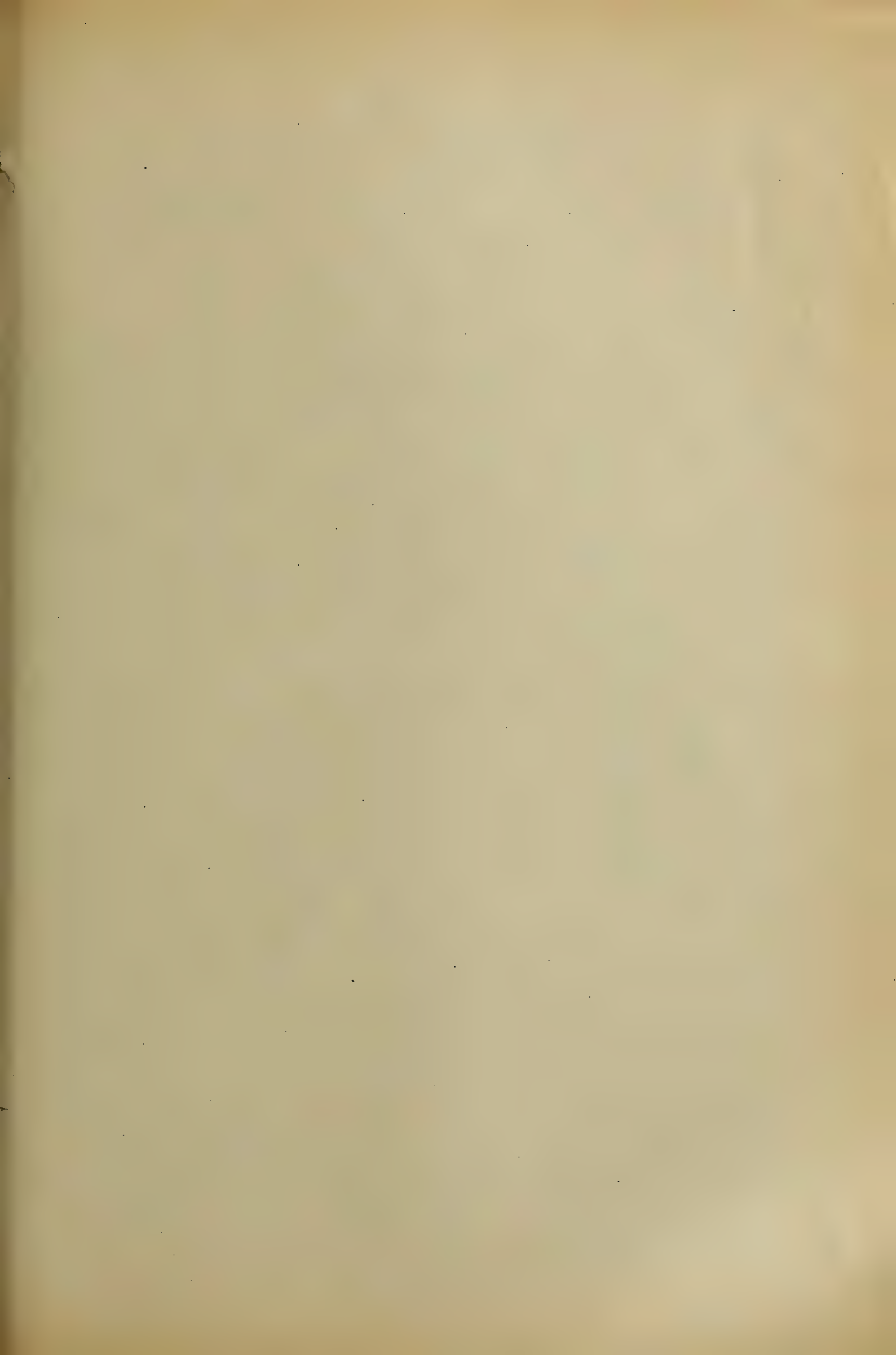


Fig. 5.



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C. W. Schwank
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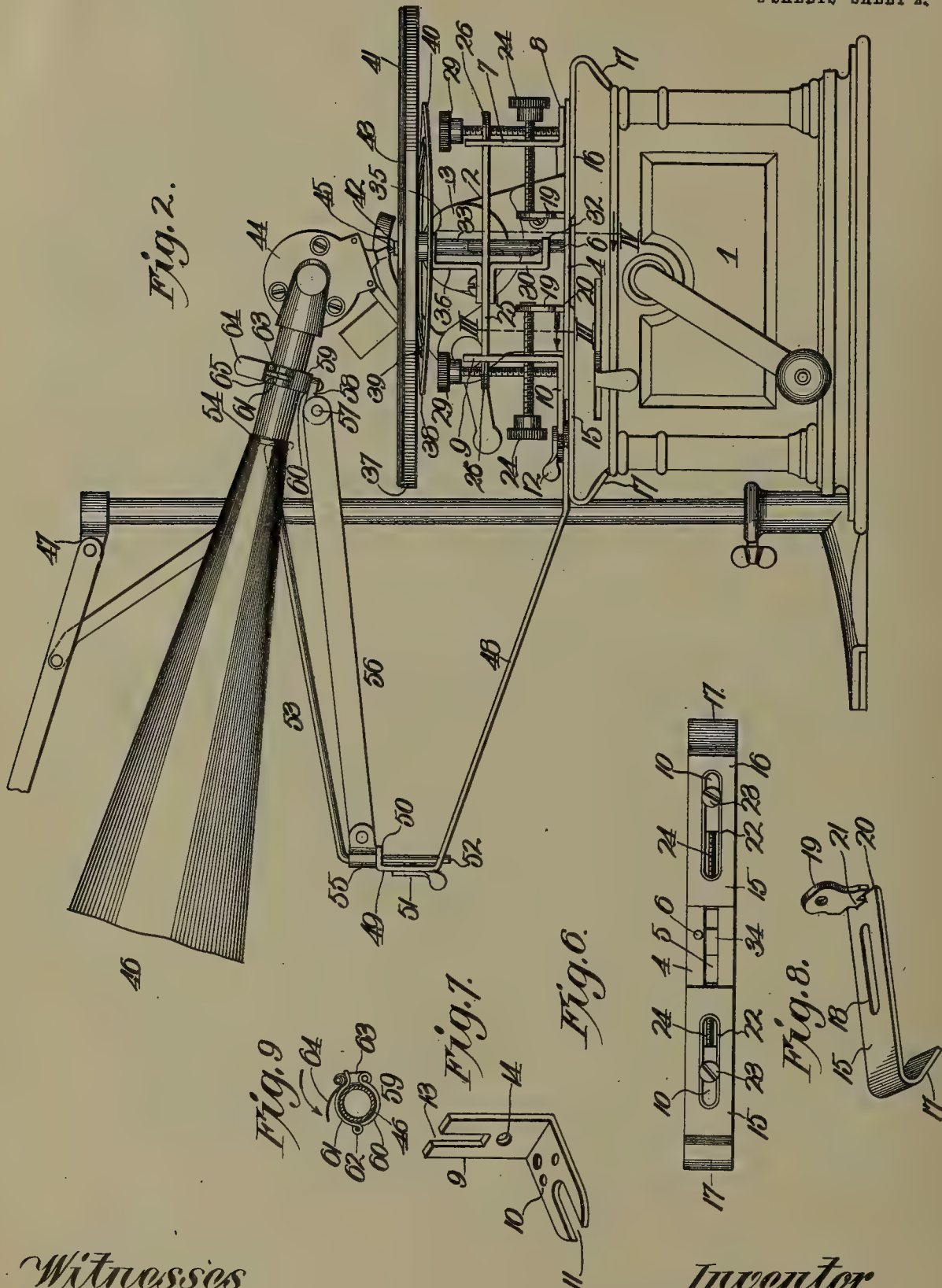


C. W. SCHWANK.
 DISK RECORD ATTACHMENT FOR SOUND REPRODUCING MACHINES.
 APPLICATION FILED MAR. 10, 1908.

898,792.

Patented Sept. 15, 1908.

2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

CHARLES W. SCHWANK, OF KANSAS CITY, MISSOURI.

DISK-RECORD ATTACHMENT FOR SOUND-REPRODUCING MACHINES.

No. 898,792.

Specification of Letters Patent.

Patented Sept. 15, 1908.

Application filed March 10, 1908. Serial No. 420,128.

To all whom it may concern:

Be it known that I, CHARLES W. SCHWANK, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Disk-Record Attachments for Sound-Reproducing Instruments, of which the following is a specification.

10 This invention relates to sound reproducing instruments and more particularly to disk attachments for cylinder graphophones or phonographs, and my object is to produce an efficient and reliable attachment of this character capable of quick and easy attachment to or removal from any of the approved sound reproducing instruments.

15 A further object is to produce an attachment of this character of simple, compact, small, durable and inexpensive construction.

20 With these objects in view and others as hereinafter appear, the invention consists in certain novel and peculiar features of construction and organization as hereinafter described and claimed, and in order that it may be fully understood reference is to be had to the accompanying drawings, in which—

25 Figure 1, is a top plan view of a graphophone of well known type, equipped with an attachment embodying my invention, the attachment being shown in section in the plane of the underside of the disk-record-carrying plate. Fig. 2, is an end view of the same. Fig. 3, is a vertical section taken on the line III—III of Fig. 2. Fig. 4, is a vertical section on the dotted line IV of Fig. 2. Fig. 5, is a top view of the vertically adjustable bridge bar. Fig. 6, is an inverted plan view of the attachment for the disk-record-carrying plate and track. Fig. 7, is a detail perspective view of one of the standards supporting and guiding the bridge bar. Fig. 8, is a detail perspective view of one of the clamp hooks of the attachment. Fig. 9, is a section of a part of the horn to illustrate the construction of the clamp forming part of the attachment.

30 In the said drawings, 1 indicates the case of a cylinder graphophone or other similar instrument. 2 is the metal frame thereof in which is journaled the cylinder 3, adapted to be driven in the usual manner during the sound reproducing operation.

35 Referring now to the attachment, 4 indicates a bar provided with a longitudinal slot 5, and near its center and at one side of

said slot with an upwardly projecting guide pin 6.

7 indicates a standard rigidly secured on bar 4 near one end of the same and provided by preference with a foot 8. 9 indicates a standard secured upon the opposite end of bar 4 and provided with a foot 10 projecting beyond the corresponding end of bar 4 and equipped at such projecting end with a bifurcation 11 for the reception of the clamping screw 12 hereinafter referred to more particularly.

60 The standards 7 and 9 are provided in their upper ends with bifurcations 13 and are also provided below said bifurcations with holes 14.

15 and 16 indicate corresponding bars provided at their outer ends with hooks 17 constituting what are hereinafter termed slidable hook clamps. Each of said slidable hook clamps is provided with a longitudinal slot 18 and at its inner end with an upwardly projecting head 19, said head being notched at each side at its lower end at 20 so as to provide the narrow neck 21 uniting the head with the body of the clamp, and slidingly occupying the slot 5 of bar 4. The walls of the slots 18 in the slidable hook clamps are preferably beveled as at 22 in order to provide countersinks wherein may be inclosed the heads of screw bolts 23 extending up through said slots into bar 4 for the purpose of providing in conjunction with necks 21, guides which will insure direct endwise reciprocation or adjustment of the slidable hook clamps.

24 indicate adjusting screws mounted in holes 14 of the standards 7 and 9 and having their inner ends secured in any well-known or suitable manner to the heads 19 of the slidable hook clamps so that when said screws are turned the hook clamps shall be caused to approach or recede from each other.

25 indicates the top or bridge bar of the device, the same being provided in its opposite edges near its ends with notches 26 to receive the bifurcated upper ends of standards 7 and 9, the relation being a sliding one so that said bridge bar may be moved upward and downward to accommodate cylinders 3 of varying diameter or height. The bridge bar is provided with a hole 27 to receive the guide pin 6 of bar 4 and at each end with a threaded hole 28 for the reception of the vertical screws 29, the lower ends of said screws being swiveled to the foot portions of

the standards so that when the screws are turned in one direction or the other the bridge bar will be raised or lowered.

To prevent any chance of rocking movement of the bridge bar, it is provided with a depending bracket 30 having a guide notch or opening 31 in sliding engagement with pin 6, the lower arm 32 of the bracket provided with said notch or opening 31, also forming a rest bearing for the lower end of a vertical shaft 33 journaled in a hole 34 in the bridge-bar and in the overhanging arm 35 of an angle bracket 36 secured to the bridge bar.

The upper end of the shaft is secured centrally to a circular plate 37 occupying a plane just above the top of the cylinder 3 and underlying said plate and interposed between the same and the cylinder is a circular track 38 arranged concentrically of shaft 33, said track being preferably of spring metal and yieldingly connected to plate 37 by spring arms 39, and in order to create and maintain friction between the circular track and the cylinder, the former is equipped at its lower side with a rubber or equivalent friction ring 40. Secured upon the plate 37 so as to turn therewith, in any suitable manner, is an ordinary disk-record 41, the preferred connection being to provide the plate with a pin 42 to extend up through the central hole, not shown, in the disk-record and to interpose a circular piece of fabric 43 between the plate and disk-record so that the former shall be incapable of turning without imparting like movement to the latter.

44 indicates a speaker of any suitable type provided with the usual pin 45 for engagement with the disk record. This speaker is connected as shown or in any other suitable manner to the horn 46 supported near its outer end from a crane 47 in the usual or any preferred manner. To supply an adjustable support for the inner end of the horn and the speaker in order that the latter may properly track on the record as the latter revolves, I provide the following construction: 48 is a bar to be slipped at one end between the hook clamp 15 and the foot 10 of standard 9, said end being equipped with the clamp screw 12 hereinbefore referred to, in order that said screw may be utilized to clamp bar 48 rigidly to said foot 10. The bar 48 may be disposed at any angle to foot 10 and extends upwardly and forwardly therefrom and terminates in an upwardly projecting arm 49 having an intumed lip 50 at its upper end and carried by arm 49 is a clamping screw 51 for engagement with the depending arm 52 of the swing bar 53, said end being journaled in bar 48 and its lip 50 and clamped at the desired point of adjustment therein by said clamping screw. At its free end bar 53 terminates in an upwardly disposed hook 54 to engage and support the reduced or inner end of the horn.

55 is a sleeve journaled to operate horizon-

tally on arm 52 above the lip 50 and pivoted to work vertically to sleeve 55, is a bar 56, which bar is also pivoted to work vertically, at 57, to the bracket 58 pivotally supporting a clamp ring 59; said ring comprising two members 60 and 61 hinged together at 62. The free end of one member pivotally carries a link 63 having at its opposite end a spring lever 64. This link is adapted to enter the bifurcation 65 in the free end of the other spring member, 61, when the spring lever is operated in the direction indicated by the arrow Fig. 9, to the position shown, to clamp the member 61 firmly to the neck of the horn.

In the drawings the speaker is shown in operative relation to the disk, so that as the cylinder revolves the disk will be driven through the frictional engagement between the track and cylinder, the music of the record being reproduced by the speaker and amplified by the horn in the usual manner. It will be observed that the progress of the needle inwardly on the disk-record as customary, is permitted because of what may be termed the universal joint connection between the clamp secured to the horn and the supporting bar 48, it being further observed that any vertical play of the needle necessitated or caused by the grooved disk-record is accommodated by the movement in a vertical plane of the link bar 56. After the piece has been reproduced the operator grasps the speaker or a nearby part of the horn to lift the needle from the disk record and then swings the speaker outward until the needle is disposed beyond the periphery of the disk. To support the speaker in such inoperative position its reduced or inner end is disposed in the hook of bar 53 and to guard against accidental movement said bar may be clamped at the desired point of adjustment by clamping screw 51.

To dismantle the attachment, the lever 64 is swung in the opposite direction to that indicated by the arrow, Fig. 9, such movement of the lever withdrawing link 63 from the bifurcation of spring member 61, to permit said spring member and its companion member 60 to be withdrawn from engagement with the horn. The clamp screw 12 is then turned to permit bar 48 to be withdrawn from engagement with foot 10. The horn and speaker supporting means is then removed. One of the screws 24 is then turned to move the slidable clamps apart slightly to permit the attachment proper, to be slid off the case.

From the above description it will be apparent that I have produced a disk-record attachment for sound reproducing instruments embodying the features of advantage enumerated as desirable and I wish it to be understood that I reserve the right to make all changes properly falling within the spirit and scope of the appended claims.

Having thus described the invention what I claim as new and desire to secure by Letters Patent, is:—

1. An attachment of the character described, comprising a bar provided with standards, a bridge bar connecting the standards, a suitably journaled shaft supported from the bridge bar and equipped with a disk-record-carrying plate and a circular track rotatable with said disk and arranged near one face of and capable of being pressed into contact with said plate.

2. An attachment of the character described, comprising a bar provided with standards, a bridge bar connecting the standards, means for adjusting said bar on its standards toward or from the standard-carrying bar, a suitably journaled shaft supported from and adjustable with the bridge bar and equipped with a disk-record-carrying plate, and a circular track rotatable with said shaft.

3. An attachment of the character described, comprising a bar provided with standards, a bridge bar connecting the standards, means for adjusting said bar on its standards toward or from the standard-carrying bar, a suitably journaled shaft supported from and adjustable with the bridge bar and equipped with a disk-record-carrying plate, and a circular track rotatable with said shaft, and of resilient material and provided with a friction face.

4. An attachment of the character described, comprising a bar provided with standards, a guide pin between and parallel with said standards, a bridge bar slidingly mounted on the standards and said guide pin and provided with an opening, a bearing bracket secured to and projecting upward from the bridge bar and overlying the opening thereof, a bracket depending from the bridge bar and provided with a foot underlying the said opening of the bridge bar, having a guide opening engaging said guide pin, a shaft journaled in the overlying bracket, and extending through said opening of the bridge-bar and resting on the foot of the said underlying bracket, a disk-record-carrying plate secured to the upper end of said shaft, and a resilient circular track underlying and rotatable with said plate.

5. An attachment of the character described, comprising a bar provided with standards, a bridge bar connecting the standards, a suitably journaled shaft supported from the bridge bar and equipped with a disk-record-carrying plate, a circular track rotatable with said shaft and arranged near one face of and capable of being pressed into contact with said plate, and means for securing the standard-carrying bar rigidly to a stationary part of a sound-reproducing instrument.

6. An attachment of the character de-

scribed, comprising a bar provided with standards, a bridge bar connecting the standards, a suitably journaled shaft supported from the bridge bar and equipped with a disk-record-carrying plate, a circular track rotatable with said shaft, and clamps adjustably connected to the standard-carrying bar for securing the latter to a stationary part of a sound-reproducing instrument.

7. An attachment of the character described, comprising a bar provided with standards, a bridge bar connecting the standards, a suitably journaled shaft supported from the bridge bar and equipped with a disk-record-carrying plate, a circular track rotatable with said shaft, and a pair of clamping hooks slidably connected to and underlying the standard-carrying bar, and screws mounted in the standards of said bar, and engaging said clamping hooks to adjust them toward or from each other.

8. The combination with a sound reproducing instrument having a driven cylinder, of an attachment comprising a standard-carrying bar overlying the case of said instrument, a bridge bar vertically adjustable upon said standards, a vertical shaft suitably journaled and supported from and vertically adjustable with said bridge bar, a disk-record-carrying plate secured to the upper end of said shaft and at one side of the same overlying said cylinder, a circular track rotatable with and underlying said plate and interposed between the same and the cylinder at one side of said shaft and exerting a yielding downward pressure on said cylinder, a speaker, and adjustable means bearing a fixed relation at one end to the standard-carrying bar and supporting said speaker with its needle in operative relation to the disk-record.

9. The combination with a sound-reproducing instrument having a driven cylinder, of an attachment comprising a standard-carrying bar overlying the case of said instrument, a bridge bar vertically adjustable upon said standards, a vertical shaft suitably journaled and supported from and vertically adjustable on said bridge bar, a disk-record-carrying plate secured to the upper end of said shaft and at one side of the same overlying said cylinder, a circular track rotatable with and underlying said plate and interposed between the same and the cylinder at one side of said shaft and exerting a yielding downward pressure on said cylinder, a speaker, adjustable means bearing a fixed relation at one end to the standard-carrying bar, and supporting said speaker with its needle in operative relation to the disk record, and an adjustable bar forming a part of said means and adapted for supporting the speaker when in inoperative relation to the disk-record.

10. The combination with a sound-repro-

5 ducing instrument embodying a case, a
 driven cylinder, a needle-equipped speaker
 and a horn connected to said speaker, of an
 attachment secured to the case and embody-
 10 ing a shaft suitably journaled and disposed
 in line with and at right angles to the axis of
 the said cylinder and provided at the upper
 end with a disk-record carrying plate partly
 overlapping the cylinder, and with a circular
 15 track underlying but rotatable with said
 plate, and also partly overlapping said cylin-
 der and exerting a yielding pressure thereon,
 a bar secured to and projecting from said at-
 20 tachment and provided at its outer end with
 a lip, a swing bar journaled for horizontal ro-
 tation in said bar and its lip and provided
 with a hook at its free end for engagement
 with the horn to support the inner end of the
 same, and means carried by the lip-equipped
 bar for securing the hook-equipped bar at the
 desired point of adjustment.

11. The combination with a sound-repro-
 ducing instrument, embodying a case, a
 25 driven cylinder, a needle-equipped speaker
 and a horn connected to said speaker, of an
 attachment secured to the case and embody-
 ing a shaft suitably journaled and disposed
 in line with and at right angles to the axis of
 said cylinder and provided at the upper end
 30 with a disk - record - carrying plate partly
 overlapping the cylinder, and with a circular
 track underlying but rotatable with said
 plate and also partly overlapping said cylin-
 der and exerting a yielding pressure thereon,
 35 a bar secured to and projecting from said at-
 tachment and provided at its outer end with
 a lip, a swing bar journaled for horizontal ro-
 tation in said bar and its lip and provided with
 a hook at its free end for engagement with the
 40 horn to support the inner end of the same,
 means carried by the lip-equipped bar for se-
 curing the hook-equipped bar at the desired

point of adjustment, a sleeve journaled for
 horizontal movement on the hook-equipped
 bar, a clamp detachably secured to the horn 45
 near the speaker, a bracket pivoted to said
 clamp for substantially horizontal movement,
 and a link bar pivotally connecting the said
 sleeve and said bracket and capable of piv-
 50 otal movement in a vertical plane.

12. In an attachment of the character de-
 scribed, a shaft suitably supported, a disk-
 record-carrying plate mounted upon said
 shaft and a circular track rotatable with said
 disk and arranged near one face and capable 55
 of being pressed into contact with said plate.

13. An attachment of the character de-
 scribed, comprising means capable of being
 secured to a sound reproducing instrument, a
 shaft suitably journaled in and carried by 60
 said means, a disk - record - carrying plate
 mounted on said shaft, and a circular track
 rotatable with said shaft and arranged near
 one face and capable of being pressed into
 contact with said plate. 65

14. The combination with a sound repro-
 ducing instrument embodying a case, a
 driven cylinder, a needle-equipped speaker
 and a horn connected to said speaker, of an
 attachment secured to the case, a shaft 70
 suitably journaled therein and provided with
 a disk-record-carrying plate, and a circular
 track engaging the circumferential surface of
 the cylinder and rotatable with said shaft
 and capable of yielding under the pressure of 75
 the cylinder and moving toward the adjacent
 face of the said plate.

In testimony whereof I affix my signature,
 in the presence of two witnesses.

CHARLES W. SCHWANK.

Witnesses:

FRANK R. GLOVE,
 G. Y. THORPE.



E. H. MOBLEY.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED AUG. 17, 1907.

899,256.

Patented Sept. 22, 1908.

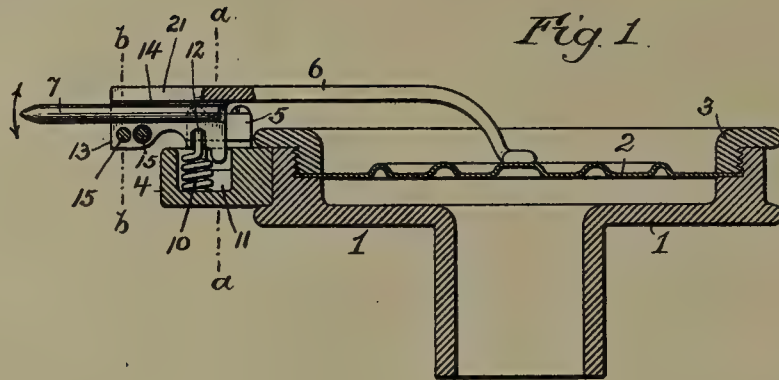


Fig. 9.

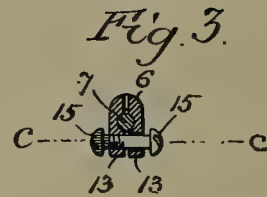
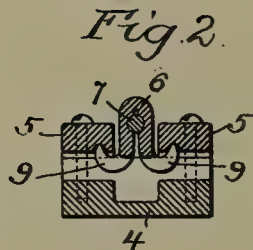


Fig. 5.

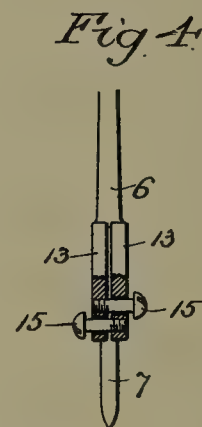
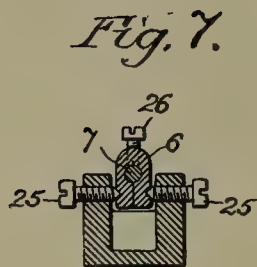
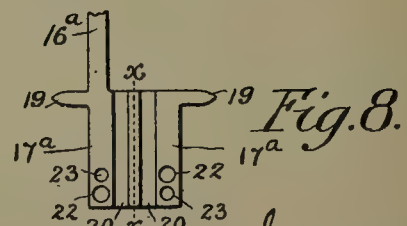
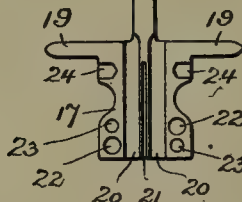
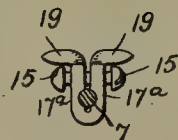


Fig. 6.



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Edwin H. Mobley
by his attorneys
Smith & Taylor

UNITED STATES PATENT OFFICE.

EDWIN H. MOBLEY, OF HILLSIDE, PENNSYLVANIA.

SOUND-BOX FOR TALKING-MACHINES.

No. 899,256.

Specification of Letters Patent.

Patented Sept. 22, 1908.

Application filed August 17, 1907. Serial No. 389,029.

To all whom it may concern:

Be it known that I, EDWIN H. MOBLEY, a citizen of the United States, residing in Hillside, Montgomery county, Pennsylvania, have invented certain Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

My invention relates to that class of sound boxes which are employed in connection with disk records, one object of my invention being to facilitate and cheapen the construction of the stylus lever; another object being to provide for the ready application to or removal from the stylus lever of the stylus or needle which engages with the record, and a still further object being to so pivot said stylus lever that an extremely sensitive action of the same will be insured. These objects I attain in the manner hereinafter set forth, reference being had to the accompanying drawing, in which

Figure 1 is a vertical longitudinal section of a sound box for talking machines constructed in accordance with my present invention; Fig. 2 is a transverse section on the line *a-a*, Fig. 1; Fig. 3 is a transverse section on the line *b-b*, Fig. 1; Fig. 4 is a bottom view of part of the stylus lever, partly in section, on the line *c-c*, Fig. 3; Fig. 5 is a view of the blank from which the stylus lever is made; Figs. 6 and 7 are views illustrating modified forms of stylus lever; Fig. 8 is a view of the blank from which the stylus lever shown in Fig. 6 is produced, and Fig. 9 is a view of the blank from which the stylus lever shown in Fig. 7 is made.

Referring in the first instance to Fig. 1 of the drawing, 1 represents the cup-like casing of the sound box to which the diaphragm 2 is secured in any suitable manner, a screw cap 3 in the present instance serving to confine the outer portion of the diaphragm against a suitably located seat on the casing.

Secured to one side of the casing 1 is a block 4 provided with laterally separated caps 5, and between these caps is disposed the stylus lever 6, which bears at its inner end upon the central portion of the diaphragm 2 and is so constructed as to carry the needle or stylus 7 which engages with the groove of the record in such manner that it will be vibrated in the directions indicated by the double arrow in Fig. 1, said vibrations being therefore transmitted through the medium of the lever to the diaphragm 2.

The stylus lever is pivoted to the block 4

by means of outwardly extending, upwardly curved, and pointed pins 9 projecting from the underside of the lever, as shown in Fig. 2, the pointed ends of these pins being seated in conical recesses formed in the undersides of the cap plates 5 of the block 4, and being maintained in contact with said cap plates by means of a spring 10 contained in the recess 11 of said block 4 and disposed in advance of the pivot pins 9, said spring terminating at the top in an upwardly extending and axially disposed pin 12 which enters a recess in the underside of the stylus lever, as shown in Fig. 1.

The head of the stylus lever is split vertically, as shown in Figs. 1 and 2, and each member 13 of the split head has formed in it a semi-circular recess 14, these recesses combining to form a socket for the reception of the stylus 7, which is so proportioned in respect to the recesses 14 that when it is inserted in the socket formed by the latter it tends to spring apart the members 13 of the split head of the lever, and is therefore retained in position by the frictional hold of said members upon it.

Each member of the split head of the lever carries a pin 15, which passes freely through an opening in the opposite member of the head, whereby inward pressure upon these pins will serve to effect the spreading apart of the members 13 of the head, and will thus permit of the withdrawal of a worn stylus and the insertion of a fresh one, the release of the pins from pressure permitting the members of the lever head to again spring towards each other and clamp the stylus between them.

While the stylus lever may, if desired, be cast with a solid head in which the various openings and slots can be formed by boring, drilling, sawing, milling, or the like, I prefer to facilitate and cheapen the construction of the stylus lever by first forging a blank of the character shown in Fig. 5, this blank comprising a stem 16, with enlarged head 17, having oppositely projecting pins 19, opposite longitudinal grooves 20, a central longitudinal incision 21, and openings 22 and 23 and a depression or pocket 24 on each side of the longitudinal center, whereby, when the expanded head of said forging is folded or bent upon a central longitudinal line and the pins 19 bent outward and upward, said pins will constitute the pivot pins 9 of the lever, the grooves 20 will form the socket

for the reception of the stylus, the pockets 24 will form the recess for receiving the upper end of the spring 10, and the openings 22 and 23 will provide for the proper mounting of the spreader pins 15, the central incision 21 insuring the separation of the opposite members 13 of the lever head and providing for the desired elasticity of the same in order that they may retain the stylus by gripping it between them.

Certain features of my invention can, however, be embodied in stylus levers differing in a number of respects from that which I have just shown and described, one of such stylus levers being shown in Fig. 6 and the blank from which it is made being shown in Fig. 8. In this blank the head 17^a is at one side of the stem 16^a and is bent on the line *x*, so as to bring the grooves 20, and openings 22 and 23 into proper relation to one another, the pins 19 projecting laterally, as shown in Fig. 8, so that they can engage suitable bearings in a fixed member of the sound box casing. This lever may, if desired, have an incision at the fold line *x*, as in the case of the lever shown in Fig. 1. Still another form of stylus lever embodying some of the features of my invention is shown in Fig. 7, the blank from which this lever is made being shown in Fig. 9. In this case the stem 16^b of the blank has a plain rectangular head 17^b, which, when folded upon a central longitudinal line and laterally compressed forms a substantially solid head for the lever, as shown in Fig. 6, which head can be recessed on opposite sides for the reception of the pointed pivot pins 25, bored longitudinally for receiving the stylus 7, and drilled and threaded for the reception of a set screw 26, whereby the stylus is confined to the lever, inasmuch as the latter lacks the elasticity in its opposite members necessary to the retention of the stylus by a frictional grip of the members of the lever upon it.

The various modifications which I have illustrated and described, are suggestive of some of the different lines of development along which my invention may be carried, and will be sufficient to indicate, to those skilled in the art, some of the variations of constructive detail within the scope of my invention.

I claim:—

1. A sound box having a diaphragm, a stylus lever, a bearing block therefor, upturned pins at the bottom of the stylus lever adapted to inverted bearings on the block, and a single central spring for retaining said pins in contact with said bearings.

2. A sound box stylus lever having a head with opposed elastic members, between which a stylus can be confined by their frictional grip upon it, and means engaging one of said members and passing freely through the other for separating said opposed mem-

bers of the lever to release the stylus from the grip of the same.

3. A sound box stylus lever having a head with opposed elastic members between which a stylus can be gripped, and pins, each carried by one of said members and projecting through and beyond the other member, one in one direction and the other in the opposite direction, whereby pressure upon the pins will effect the separation of said elastic members.

4. A sound box stylus lever comprising a stem and an enlarged head, the latter being folded on a longitudinal line disposed centrally between opposite symmetrical portions of the head.

5. A sound box stylus lever comprising a stem and an enlarged head, the latter being folded on a longitudinal line and having an incision, on the line of fold.

6. A sound box stylus lever comprising a stem and an enlarged head, the latter being folded on a longitudinal line, and having, on opposite sides of said longitudinal line, grooves which, when the head is folded, cooperate to provide a socket for the reception of the stylus.

7. A sound box stylus lever comprising a stem and an enlarged head, the latter being folded on a longitudinal line, and having, on opposite sides of said longitudinal line, grooves which cooperate to form a socket for the reception of the stylus, and openings for the reception and play of separator pins.

8. A sound box stylus lever comprising a stem and an enlarged head, the latter being folded on a central longitudinal line, and having, on opposite sides of said central longitudinal line, pockets which, when the head is folded, cooperate to form a recess for the reception of the end of a tension spring.

9. A sound box stylus lever comprising a stem and an enlarged head, the latter being folded on a longitudinal line, and having, on opposite sides of said longitudinal line, projecting pins, which, when the head is folded, constitute pivot pins therefor.

10. A sound box stylus lever having a stem with an enlarged head, a longitudinal incision, and longitudinal grooves on opposite sides of the latter, which, when the head is folded on a line co-inciding with said incision, will form a socket for the reception of the stylus.

11. A sound box stylus lever having a stem with an enlarged head, the latter having a longitudinal incision, longitudinal grooves, and laterally projecting pins, whereby, when the head is folded upon a line co-inciding with said incision, said grooves will form a socket for the reception of the stylus and the projecting pins, when bent outwardly, will serve as pivots for the stylus lever.

12. A sound box stylus lever comprising a stem and an enlarged head, with longitudinal incision, longitudinal grooves and transverse

perforations, whereby, when said head is folded on a line co-inciding with the incision, said grooves will form a socket for the reception of the stylus, and said perforations will be available for the passage and support of spreader pins.

13. A sound box stylus lever comprising a stem and an enlarged head, with central longitudinal incision, longitudinal grooves, and transverse pockets, whereby, when said head is folded on a line co-inciding with said incision, said grooves will form a socket for the reception of the stylus and said pockets will constitute a recess for the reception of the end of a tension spring.

14. A sound box stylus lever comprising a stem and an enlarged head, with central longitudinal incision, longitudinal grooves,

projecting pins, transverse pockets and pairs of perforations, whereby, when the head is folded on a line co-inciding with the incision, the longitudinal grooves will form a socket for the reception of the stylus, the perforations will provide for the support and passage of separator pins, the pockets will constitute a recess for the reception of the end of a tension spring, and the pins, when bent outwardly, will serve as pivots for the stylus lever.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

EDWIN H. MOBLEY.

Witnesses:

HAMILTON D. TURNER,
KATE A. BEADLE.



899,464.

Patented Sept. 22, 1908.

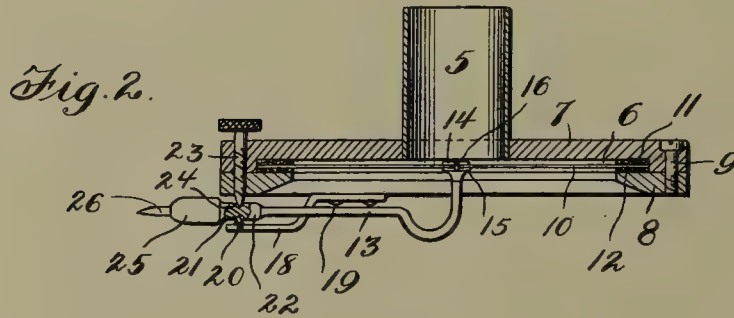
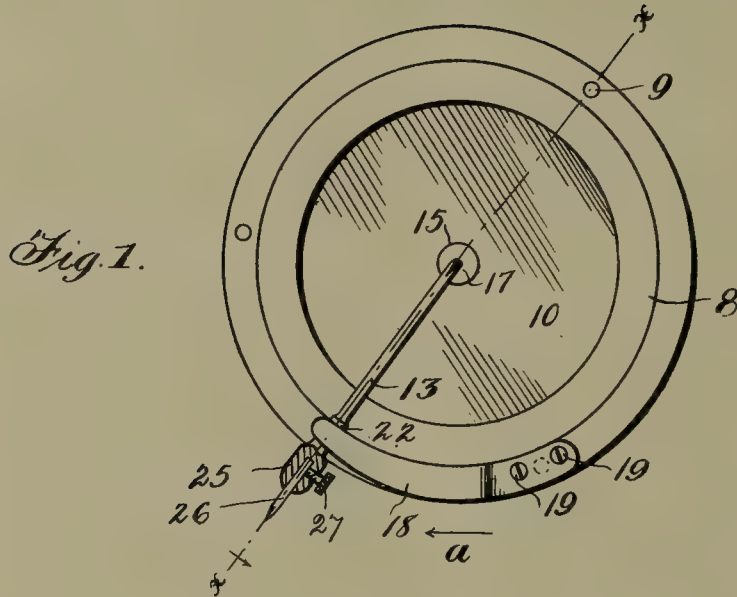


Fig. 3.

Witnesses
M. E. Connor,
A. Murray.

Inventor
Harry Nies.

By *Shepherd & Campbell*
 Attorneys

UNITED STATES PATENT OFFICE.

HARRY NIES, OF BALTIMORE, MARYLAND, ASSIGNOR OF ONE-HALF TO JAMES H. CORRIGAN,
OF BALTIMORE, MARYLAND.

GRAPHOPHONE SOUND-BOX.

No. 899,464.

Specification of Letters Patent.

Patented Sept. 22, 1908.

Application filed March 24, 1908. Serial No. 422,902.

To all whom it may concern:

Be it known that I, HARRY NIES, a citizen of the United States, residing at Baltimore, State of Maryland, have invented certain
5 new and useful Improvements in Graphophone Sound-Boxes, of which the following is a specification.

My invention relates to sound boxes for graphophones and particularly to means for
10 controlling the degree of vibration of the stylus bar, whereby the pitch of the composition being played may be varied at will. By the use of this invention, a graphophone record is given a widely increased range. It
15 is a well known fact that the key of a piece played upon a graphophone varies with the speed of the record. I accomplish this purpose of varying the key without varying the speed of the record, by the means hereinafter
20 set forth.

A further object of the invention is to so construct the parts that the weight of the sound box will be decreased and a neat and ornamental structure provided.

25 A further object of the invention is the provision of improved means for securing the inner end of the stylus bar to the diaphragm without the use of glue or wax.

30 Further objects and advantages of the invention will be set forth in the detailed description which now follows:—

In the accompanying drawing Figure 1 is a side elevation of a graphophone sound box constructed in accordance with the invention. Fig. 2 is a sectional view upon line
35 *xx* of Fig. 1 and looking in the direction indicated by the arrows and Fig. 3 is a detail view of the connection between the stylus bar and the diaphragm.

40 Like numerals designate corresponding parts in all of the figures of the drawing.

Referring to the drawing, the numeral 5 designates the usual tubular member adapted to be secured to the horn of the graphophone
45 (not shown). A shallow recess 6 is formed in the face of a plate 7 and the tubular member 5 is secured to this plate. A ring 8 is adapted to be clamped firmly against the outer edge of the plate 7 by screws 9. The
50 outer edge of the diaphragm 10 lies between two packing rings 11 and 12, these packing rings being preferably of blotting paper which I find retains its life or elasticity indefinitely. Upon the contrary, rubber or
55 like resilient packing rings lose their elas-

ticity in the course of time. In securing the inner end of the stylus bar 13 to the diaphragm, I first secure the metallic washers 14 and 15 to the center of the diaphragm by a rivet 16. I then solder the inner end of
60 the stylus bar to the outer washer as is best indicated at 17 in Fig. 3. Thus it is unnecessary to use either wax or glue to secure the stylus bar to the diaphragm. A spring
65 tongue 18 is secured by screws 19 to the ring 8. The free end of this spring tongue carries a point 20 which enters a recess 21 formed in one side of an enlarged portion 22 of the
70 stylus bar. A set screw 23 is threaded into the plate 7 and ring 8 and has a pointed end which enters a recess 24 formed in the opposite side of this enlarged portion. A recessed head 25 formed upon the outer end
75 of the stylus bar is adapted to receive the usual pin 26 beneath which the record travels. A set screw 27 provides means for holding the pin 26 in position.

The operation of the device is as follows:— The direction of rotation of the record is that indicated by the arrow —*a*—. The enlarged
80 shoulder 22 of the stylus bar being engaged by the point 20 and the screw 23, said stylus bar is caused to maintain the position indicated in Fig. 1. It will be seen, however, that by screwing up or unscrewing the screw
85 23, the stylus bar will be more or less rigidly bound between the pointed end of this screw and the spring tongue 18, and that consequently its degree of vibration may be controlled while the graphophone is running and
90 without removing the horn. I have found in actual practice that this control of the vibration of the stylus bar enables me to produce any desired modification of the pitch of the record. From the foregoing description
95 it will be seen that simple and efficient means are herein provided for accomplishing the objects of the invention, but while the elements shown and described are well adapted to serve the purpose for which they are intended,
100 it is to be understood that the invention is not limited to the precise construction set forth but includes within its purview such changes as may be made within the scope of the appended claims.

Having described my invention, what I claim is:—

1. In a graphophone sound box the combination with a body portion of a diaphragm,
110 means for clamping said diaphragm within

said body portion, a stylus bar, means for connecting the inner end of the stylus bar to said diaphragm, a spring tongue secured to the body portion and having a free outer end which lies outside of the stylus bar, a member 5 carried by said spring tongue and adapted to engage one side of an enlarged portion of said stylus bar and a set screw threaded into the body portion and adapted to engage the 10 other side of said enlarged portion of the stylus bar.

2. In a graphophone sound box the combination with a body portion, of a diaphragm, means for clamping said diaphragm within 15 said body portion, a stylus bar, means for securing the inner end of said stylus bar to said diaphragm, a spring tongue secured to said body portion having a free outer end which engages one side of the stylus bar and a later- 20 erally movable and manually operable member which engages the opposite side of said stylus bar to bind said stylus bar between itself and the free end of the spring tongue to thereby control the degree of vibration of 25 said stylus bar.

3. In a graphophone sound box, the combination with a body portion, of a diaphragm, a clamping ring adapted to clamp said diaphragm within said body portion, a stylus 30 bar, means for connecting the inner end of the stylus bar to said diaphragm, a spring member comprising a base portion which is secured to the outer face of the clamping ring, and an off-set tongue member having a 35 resilient free end which lies outside of the

stylus bar, a member carried by said resilient free end of the spring tongue and adapted to engage one side of an enlarged portion of said stylus bar, and a manually operable set 40 screw working in said body portion and clamping ring and adapted to engage the other side of said enlarged portion of the stylus bar to bind said stylus bar between itself and the resilient free end of the spring 45 tongue.

4. In a graphophone sound box, the combination with a body portion, of a diaphragm, a clamping ring adapted to clamp said diaphragm within said body portion, a stylus 50 bar, means for connecting the inner end of the stylus bar to said diaphragm, a spring member comprising a base portion which is secured to the front vertical face of the clamping ring and an off-set tongue member hav- 55 ing a resilient free end which lies outside of the stylus bar, a member carried by said resilient free end of the spring tongue adapted to engage one side of an enlarged portion of the stylus bar, and a manually operable set 60 screw working in said body portion and clamping ring and adapted to engage the inner side of said enlarged portion of the stylus bar to bind said stylus bar between itself and the resilient free end of the spring tongue.

In testimony whereof I affix my signature, 65 in presence of two witnesses.

HARRY NIES.

Witnesses:

JAMES H. CORRIGAN,
THOMAS G. HULL.

899,491.

Patented Sept. 22, 1908.

2 SHEETS—SHEET 1.

Fig. 1.

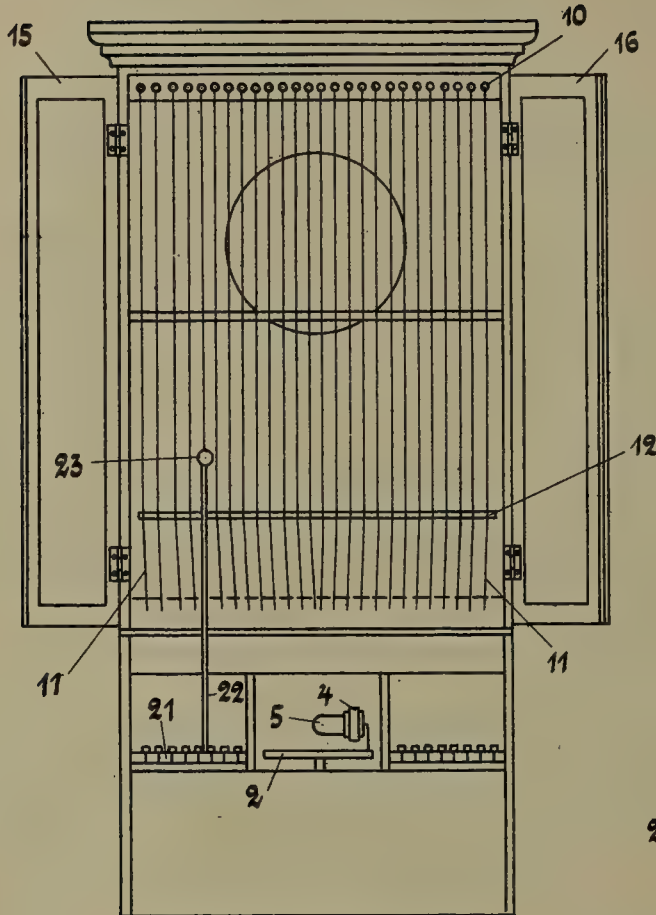


Fig. 2.

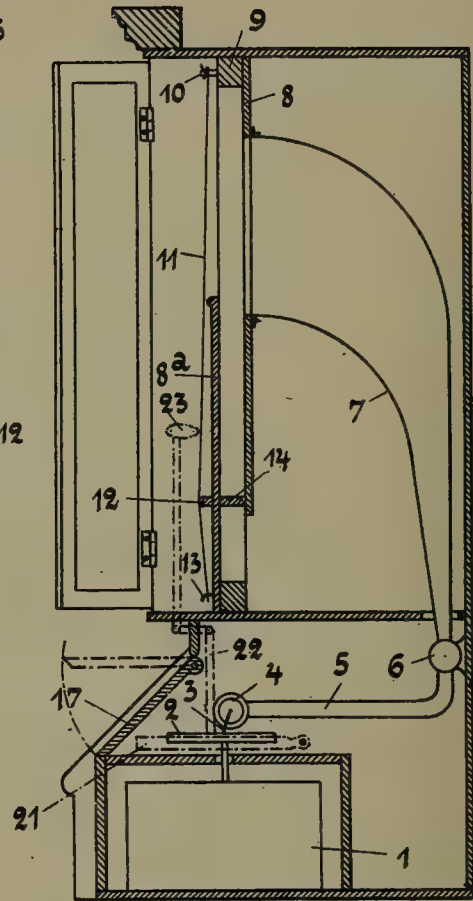
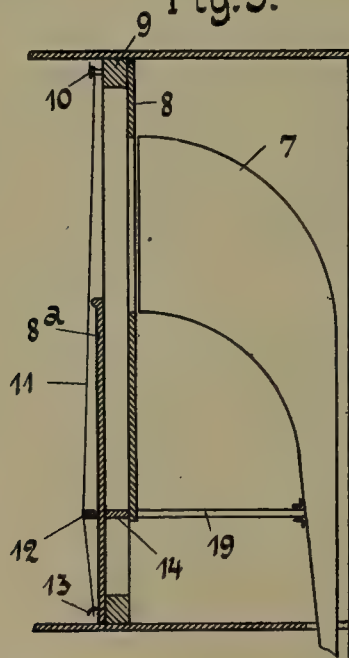


Fig. 3.



WITNESSES
W. P. Burk
In Petition

INVENTOR
Heinrich Klenk
J. M. Ballou, Atty.

899,491.

Patented Sept. 22, 1908.

2 SHEETS—SHEET 2.

Fig. 4.

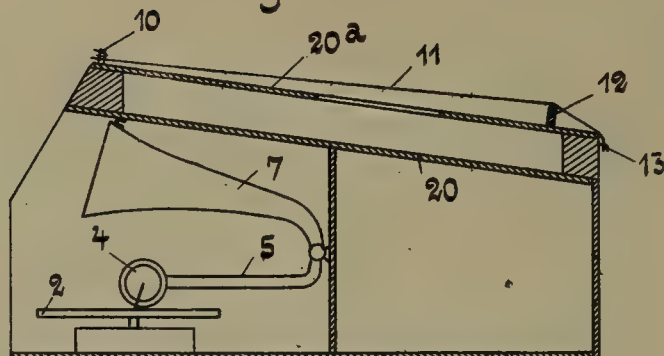


Fig. 5.

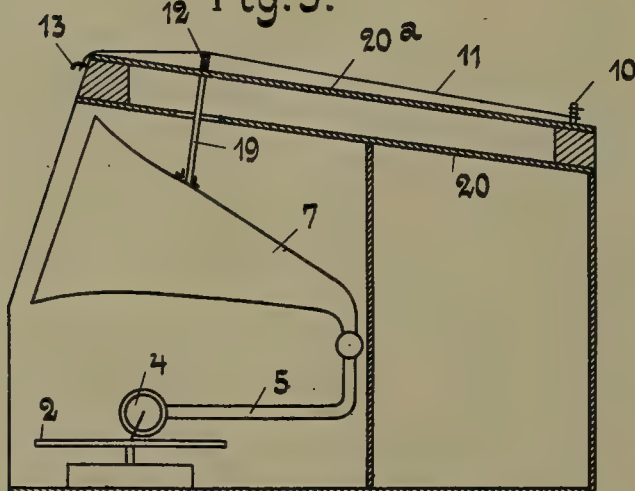
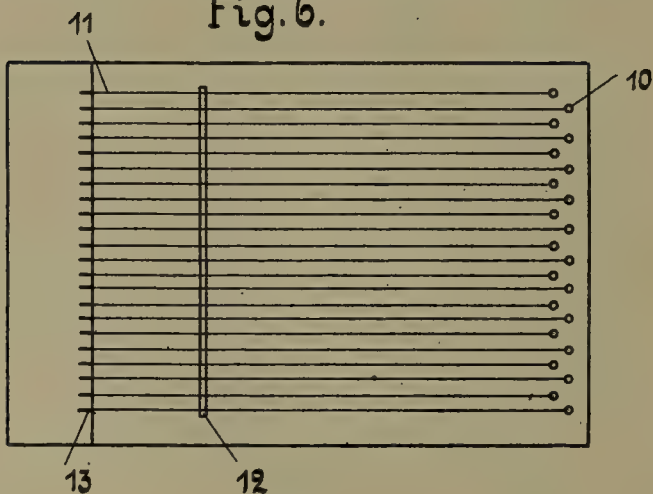


Fig. 6.



WITNESSES

W. P. Bursk
W. C. Burt

INVENTOR

Heinrich Klenk
By *McMullen* ATTORNEY

UNITED STATES PATENT OFFICE.

HEINRICH KLENK, OF HANAU, GERMANY, ASSIGNOR OF ONE-HALF TO HERMANN KREBS,
OF HANAU, GERMANY.

TALKING-MACHINE.

No. 899,491.

Specification of Letters Patent.

Patented Sept. 22, 1908.

Application filed February 28, 1907. Serial No. 359,791.

To all whom it may concern:

Be it known that I, HEINRICH KLENK, a subject of the Emperor of Germany, and resident of Hanau-on-the-Main, Germany, have
5 invented a certain new and useful Improvement in Talking Machinery, of which the following is a specification.

This invention relates to a talking machine which is inclosed in a casing and has for its
10 object to effect an increase in the fullness of the sound and enrichment of the tone in such instruments. To this end the casing is provided with a series of strings which are directly or indirectly caused to vibrate by the
15 sound waves produced by the talking machine. They vibrate directly when arranged in front of the trumpet mouth of the said machine and are therefore struck by the sound waves. It suffices however to attach the
20 strings to the casing preferably by interposing one or more resonance boards without having the trumpet open exactly behind the sound orifice. In this case the strings are caused to vibrate by the sounding trumpet
25 setting the surrounding air and the casing itself and attached resonance boards into vibration, which vibration is transmitted to the strings. With such an arrangement it suffices to provide groups of strings so that
30 each group corresponds to a definite tone, in order to strengthen the clear tones, for instance those of the piano and violin, whereby the reproduction of the tones is enriched. A further increase of the fullness of sound and
35 enrichment of the tone is effected by the arrangement of attuned strings so that for each note of the talking machine at least one string is caused to vibrate: while this takes place with the arrangement of suitable strings
40 or of groups of like strings or with some of these.

Preferably the invention is so devised that the casing forms at the same time the resonance board of an attuned stringed instrument, the effect being further increased by
45 interposing a sound post or "voice" between the trumpet of the talking machine and the bridge of the strings. Besides the enrichment of the tones in the reproduction of a
50 tune by means of a talking machine connected with an attuned stringed instrument there is also obtained the possibility of being able to strike the same tune on the instrument or at least to play some accompani-
55 ments to the same.

In the accompanying drawing which illustrates several embodiments of the invention Figure 1 is a front elevation of a talking machine inclosed in a casing, the strings being stretched on the front wall of the casing provided with the sound orifice. Fig. 2 is a longitudinal section of the construction shown in Fig. 1. Fig. 3 is a part longitudinal section showing a modification. Figs. 4 to 6 show two further modifications of a talking
60 apparatus inclosed in a casing combined with a zither.

As shown, the casing is formed like a box in the lower part of which the talking machine is fitted, which consists in the usual
70 actuating mechanism 1, the rotatable record disk 2, the stylus 3, the sound box 4, and the movable arm 5. On the arm 5 which is pivoted to the ball joint 6 is connected the trumpet 7. The mouth of this latter is opposite the sound orifice of a wall 8 serving as a resonance board, which forms only a part of the front wall of the casing. In front of it is provided another resonance board 8 which extends to the lowest quadrant of the sound
80 orifice and is secured to a rectangular frame 9. The upper bar of the frame carries the string-block 10 to which strings 11 are connected, which are led over the bridge 12 of the board 8^a to the hooks 13. The board 8^a is kept apart from the board 8 by a distance
85 piece 14. The trumpet 7 is connected in any manner, by small ties, or by an annular flange, with the board 8. The front side of the upper part of the casing has doors 15, 16. The lower part of the casing in which is the rotatable record disk is accessible by a hinged
90 door 17 so as to be able to exchange the records.

The sound waves produced by the apparatus and issuing from the trumpet pass
95 through the mouth of the same into the air and thereby cause the strings 11 and the resonance boards to vibrate by the direct action of the sound waves. Further, the
100 vibrating trumpet which is secured to the board 8 transmits its vibrations to the latter which transmits it through the distance piece 14 to the resonance board 8^a. The effect of the strings is thus considerably increased, and unpleasant accessory sounds produced in any case by the talking machine are rendered inaudible.

The connection of the trumpet 7 with the board 8 need not take place at the mouth of
110

the former but may be effected as shown in Fig. 3 by means of a sound post 19 secured to the neck of the trumpet.

In the construction shown in Fig. 4 the disk 2 is rotatably arranged in known manner in the casing open at one end. The sound box 4 is operated therefrom by means of the stylus, the sound box being connected to the movable arm 5 and the trumpet 7. Above the upper wall 20 of the casing is arranged a second wall 20^a which carries the string-block 10, the bridge 12 and the hooks 13 for the strings 11. The resonance board formed by the walls 20 and 20^a has the form of a zither (Fig. 6).

The sound waves produced by means of the disk through the medium of the stylus and sound box pass for the greatest part through the trumpet into the air. A part however will simultaneously with the vibrations of the trumpet set the entire casing in vibration, the vibrations being transmitted to the upper resonance board and so to the strings. At each note the corresponding string which is attuned thereto vibrates and strengthens the tone. If the trumpet is as shown in Fig. 4 secured to the lower wall 20 the vibrations of the trumpet are better transmitted to the board. Further the strings can be struck to the tune reproduced by the talking apparatus or an accompaniment or at least some primary accord can be played.

In the construction shown in Figs. 5 and 6 the sound waves act on the strings in the same manner as in the case of Fig. 4. Only, the action is further increased by interposing a sound post 19 between the trumpet 7 and the bridge 12, which passes through a slot in the lower board. In this way a direct transmission of the vibrations of the trumpet to the strings is effected so that these are considerably assisted, that is the tone is louder and purer.

It is obvious that the present invention is not limited to the combination of a talking machine inclosed in a casing with a zither, but that any stringed instrument can be substituted for the zither. Further, it is not necessary that the stringed instrument be struck by hand, but this may be effected mechanically. For example the present invention may be combined with a piano as indicated in Figs. 1 and 2. For this the cen-

tral part of the casing is divided into three compartments in the middle one of which is the record disk, and in the outer one are the piano keys 21. The keys 21 are connected by the usual mechanism 22, which is only indicated diagrammatically, with the hammer 23. The strings 11 form part therefore of the strings of a piano.

In the reproduction of a tune by means of this apparatus by striking the keys 21 the melody can be accompanied or at least a vamp can be played or a mechanical accompaniment effected.

It is to be understood that by the term talking machines I mean to include gramophones, graphophones, phonographs and the like.

Having described my invention what I claim and desire to secure by Letters Patent of the United States is:—

1. The herein described apparatus, comprising a casing, a talking machine inclosed therein and strings attached to said casing, said strings adapted to be vibrated by the sound waves produced by the talking machine.

2. The herein described apparatus, comprising a casing, a talking machine inclosed in said casing and having a trumpet, and resonance strings arranged in front of the trumpet, the trumpet and the front wall of the casing serving as a resonance board.

3. The herein described apparatus, comprising a casing, a talking machine inclosed in the casing and having a trumpet, a double resonance board arranged in front of the trumpet, of which board one member has a sound orifice opposite the mouth of the trumpet, and a bridge and strings and securing devices carried by the other member of the double resonance board.

4. The herein described apparatus, comprising, a casing, a talking machine inclosed in said casing, and strings attached to said casing, said strings being attuned to the talking machine.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

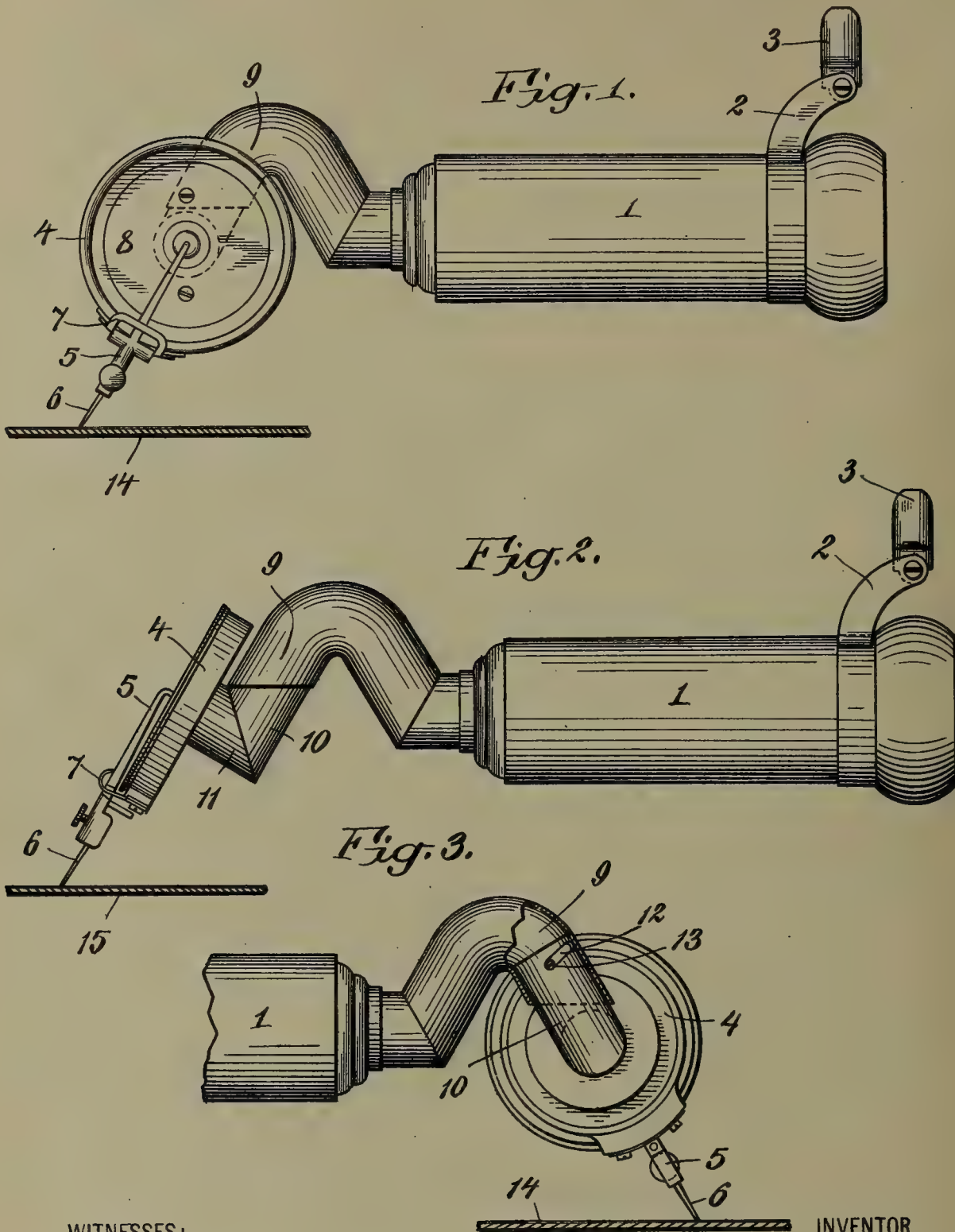
HEINRICH KLENK.

Witnesses:

BERNHARD RAISER,
JEAN GRUND.

899,874.

Patented Sept. 29, 1908.



WITNESSES:

S. Bardett
J. M. Intosh

INVENTOR

Thomas Kraemer

BY

J. P. Edwards
ATTORNEY

UNITED STATES PATENT OFFICE.

THOMAS KRAEMER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

TALKING-MACHINE.

No. 899,874.

Specification of Letters Patent.

Patented Sept. 29, 1908.

Application filed March 7, 1908. Serial No. 419,658.

To all whom it may concern:

Be it known that I, THOMAS KRAEMER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Talking-Machines, of which the following is a specification.

This invention relates to talking-machines and has reference particularly to the manner in which the sound-boxes of such machines are connected to the sound-conveying and-amplifying devices thereof.

As is well known, record-tablets for the mechanical reproduction of recorded sounds, whether of cylinder, disk or other form, are of two types depending on the character of the undulations of the record-groove, these being termed the vertically undulating and the laterally undulating types. For reproducing sounds from these two types of record-tablets, machines differing in construction have heretofore been required, so that a person having but one machine could use only records of one of these two types.

The object of my invention is to provide a talking-machine so constructed that it may be used to reproduce sounds from either of these two types of records differing in the character of the sound-undulations of the record-groove. This is accomplished by providing a sound-box which is arranged to assume either of two operative positions, in one of which the stylus of the sound-box will co-operate with a record of the vertically undulating type to reproduce the recorded sounds and in the other of which it will coöperate with a record of the laterally undulating type. Thus, the sound-conveying device of the talking-machine, consisting of either an amplifying horn alone or a combined horn and tone-arm may have a joint therein permitting movement of the sound-box to either of its two positions.

In the preferred embodiment of the invention, a tone-arm is employed and a joint is provided near the free end thereof such that the sound-box may be moved from one operative position to a second operative position in which its diaphragm is disposed at a right angle to the plane of the diaphragm when the box is in the first position.

One embodiment of the invention is illustrated in the accompanying drawings, in which

Figures 1 and 2 are views in elevation of the tone-arm and sound-box showing the two positions of the latter, and Fig. 3 is a sectional elevation of the sound-box and a portion of the tone-arm.

Referring to these drawings, 1 indicates a tubular tone-arm of any suitable construction, this being adapted to be pivotally mounted at one end on a coupling-member extending outwardly from the motor-box of a talking-machine. For the purpose of such pivotal mounting, the tone-arm is here shown as having a yoke 2 secured thereto in which is pivoted a cross-head carrying a sleeve 3 adapted to receive a vertically-disposed pin on the coupling-member above mentioned. The other end of the tone-arm carries the sound-box 4 having a stylus-lever 5 in which is secured a stylus 6. The lever 5 is pivotally mounted on the wall of the box by having notched lugs thereon in which are received knife-edges on a sheet-metal member 7 secured to the box. Member 7 is bent over at its end and bears on lever 5 to hold the inner end of the lever yieldingly against the diaphragm 8 of the box.

At its outer end, the tone-arm 1 is bent, preferably in the manner shown, to form a portion 9 therein the axis of which is inclined to the axis of the main portion of the tone-arm. The portion 9 is adapted to receive a tubular extension 10 on the sound-box 4, this extension being connected to the sound-box by a short tubular piece 11 and having its axis substantially parallel to the diaphragm 8. In the extension 10 is a slot 12 into which enters the end of a pin 13 extending inwardly from the portion 9, slot 12 being of such size as to permit extension 10 to turn in tube 9 through ninety degrees. The tubular extension 10 fits snugly within the tubular portion 9 and excessive relative movement of the parts in the direction of their axis is precluded by the pin 13. Preferably the parts are so formed that in one or both of the positions of the sound-box, the end of portion 9 bears upon the piece 11 at the junction of the latter with the extension 10 to assist in holding the sound-box

and the parts connected thereto steadily in position. If desired, the slot 12 may be so formed that it extends in the direction of the length of tube 10 as well as around the same so that the turning movement of the sound-box will cause tube 10 to move into and out of tube 9; such relative movement of tubes 9 and 10 may be desirable to compensate for the use of styluses of different lengths in the two positions of the sound-box and the slight change which would otherwise be made in the distance of the end of the stylus-lever from the axis of the tone-arm when the sound-box is moved from one position to the other due to the fact that in its movement the sound-box turns about an axis inclined to that of the tone-arm.

Figs. 1 and 2 illustrate the two operative positions of the sound-box relatively to the tone-arm and in these figures 14 indicates a disk sound-record having a record-groove of the laterally undulating type, while 15 indicates a similar record having a groove of the vertically undulating type. In Fig. 1, it will be seen that the diaphragm of the sound-box lies in a plane substantially parallel to the axis of the tone-arm in a position to be vibrated by the coaction of the stylus with lateral undulations in the record-tablet 14; in Fig. 2, however, the diaphragm extends across the axis of the tone-arm and is somewhat inclined so that it will be vibrated by the coaction of its stylus with vertical undulations.

The movement of the sound-box about the pivotal connection thereof to the tone-arm carries the box to either of two operative positions, and in both of these positions the single stylus of the sound-box projects from the box in the same direction, that is, downwardly in the structure shown in the drawings; therefore, a talking-machine equipped with such a tone-arm and sound-box may be used with sound-records of the same form, as disk records, but differing as to the character of the sound undulations, as vertical or lateral, these disks being mounted upon the same support as the turn-table of the machine.

Having now described my invention, what I claim as new therein and desire to secure by Letters Patent is as follows:—

1. In a talking machine, a sound-box having a diaphragm and a tubular connection thereto for carrying sound, said connection having a joint therein permitting movement of the sound-box to either of two operative positions, a single stylus being adapted to vibrate the diaphragm in either of said positions and said stylus projecting in substantially the same direction from the sound-box

in both of said positions, substantially as set forth.

2. In a talking-machine, a sound-conveying tube, and a sound-box pivotally mounted thereon and provided with a single stylus, said box being movable about the pivotal axis through ninety degrees to carry it to either of two operative positions in both of which said stylus projects in substantially the same direction from the sound-box, substantially as set forth.

3. In a talking-machine, a sound-conveying tube and a sound-box having a diaphragm mounted on said tube and movable from a position in which the diaphragm is parallel to the axis of the tube to a position in which the diaphragm extends across said axis, substantially as set forth.

4. In a talking-machine, a sound-conveying tube, a sound-box having a single stylus, and two telescoping tubular pieces, one on said tube and the other on said box, permitting movement of the sound-box relatively to the tube to either of two operative positions in both of which said stylus projects in substantially the same direction from the sound-box, substantially as set forth.

5. In a talking-machine, a sound-conveying tube, a sound-box having a single stylus, two telescoping tubular pieces, one on said tube and the other on said box, permitting movement of the sound-box relatively to the tube to either of two operative positions in both of which said stylus projects in substantially the same direction from the sound-box, and a pin on one of said pieces entering a slot in the other, substantially as set forth.

6. In a talking-machine, a sound-conveying tube having a tubular portion at its end turned at an acute angle to the axis of the tube, and a sound-box having a stylus pivotally mounted on said portion and adapted to be turned about the same to either of two operative positions, substantially as set forth.

7. In a talking-machine, a sound-conveying tube having a tubular portion at its end turned at an angle to the axis of the tube, and a sound-box having a stylus and a tubular piece fixed to the box and telescoping with said portion to permit turning the sound-box relatively to said tube to either of two operative positions, in both of which the stylus of the sound-box projects in substantially the same direction from the sound-box, substantially as set forth.

This specification signed and witnessed this 26th day of February, 1908.

THOMAS KRAEMER.

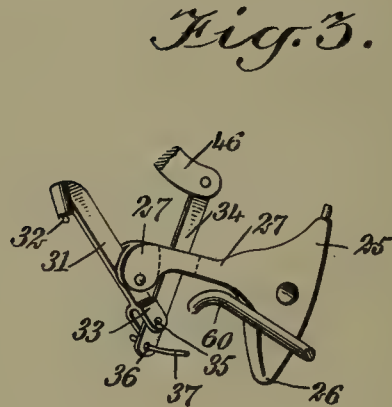
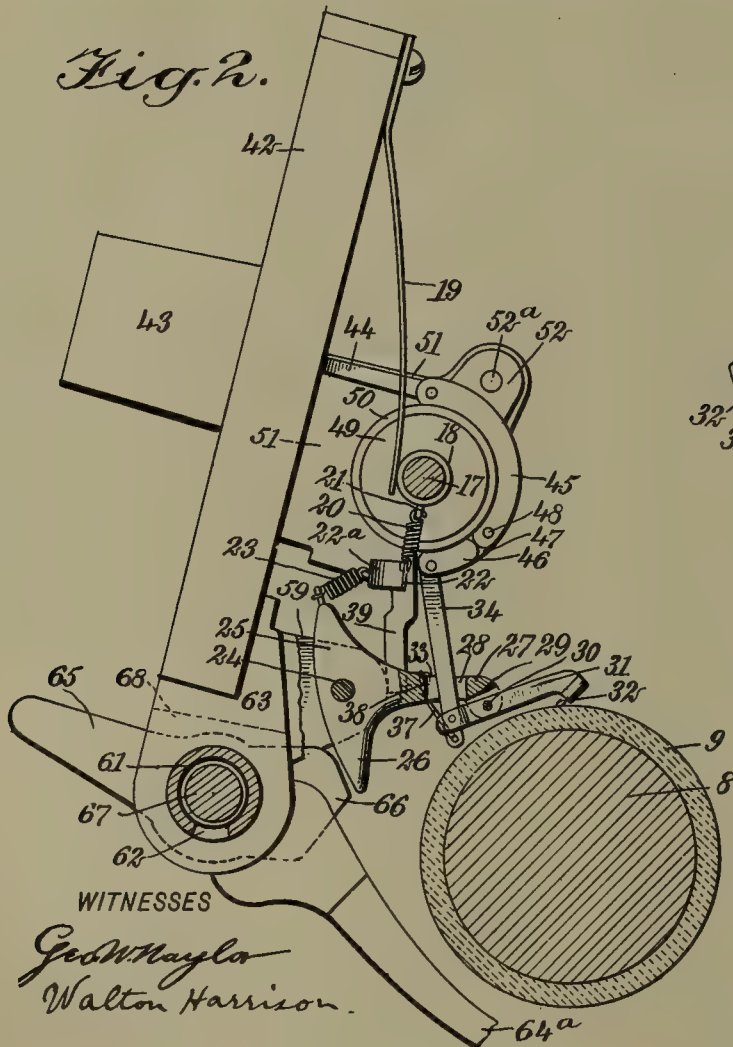
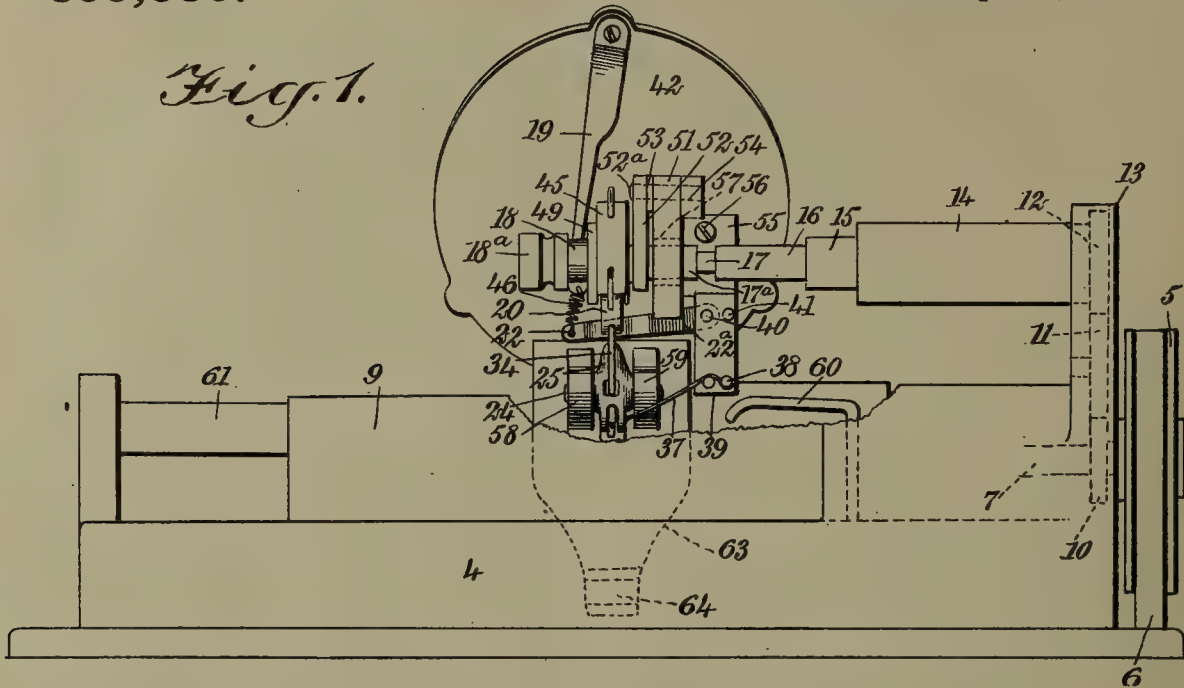
Witnesses:

AMIL SCHNELL,
H. MUHLSCHLEGEL.

C. MARTELOCK.
ATTACHMENT FOR TALKING MACHINES.
APPLICATION FILED DEC. 31, 1907.

899,880.

Patented Sept. 29, 1908.



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CHARLES MARTELOCK, OF OROVILLE, CALIFORNIA.

ATTACHMENT FOR TALKING-MACHINES.

No. 899,880.

Specification of Letters Patent.

Patented Sept. 29, 1908.

Application filed December 31, 1907. Serial No. 408,809.

To all whom it may concern:

Be it known that I, CHARLES MARTELOCK, a citizen of the United States, and a resident of Oroville, in the county of Butte and State of California, have invented a new and Improved Attachment for Talking-Machines, of which the following is a full, clear, and exact description.

My invention relates to talking machines, my more particular object being to provide an attachment for a machine known commercially as the "B. C." graphophone, for the purpose of increasing the delicacy of adjustment between the record and the stylus needle, and also increasing the general efficiency of the apparatus.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a rear elevation of the graphophone provided with my attachment, this view showing the stylus needle, the weighted lever supporting the same, means for tensioning the lever, and also showing the pawl for raising the stylus out of engagement with the sound record; and Fig. 2 is an enlarged side elevation of the graphophone, parts being in section, and showing the drag shoe for actuating the diaphragm, the friction wheel engaging the drag shoe, the stylus needle and accompanying parts for tensioning the drag shoe relatively to the friction wheel, and also showing the pivotally mounted weight for supporting the stylus needle and its accompanying parts. Fig. 3 is a fragmentary perspective showing how, at a predetermined point in the travel of the carriage, the stylus is raised out of engagement with the record.

The casing of the machine is shown at 4 and at 5 is a main driving pulley actuated by a belt 6. A main driving shaft is shown at 7 and a revoluble mandrel at 8. A sound record 9 is mounted upon the mandrel in the usual manner. Mounted upon the main shaft 7 is a gear wheel 10 which meshes with another gear wheel 11, and the latter meshes with a third gear wheel 12. These gear wheels are mounted in a box 13 integral with the casing, and extending laterally from this box is a stationary sleeve 14. A tubular shaft 15 is connected with the gear wheel 12 and extends through the bearing sleeve 14, and telescopically mounted within the tubular sleeve 15 is another tubular sleeve 16,

and through the latter extends a revoluble shaft 17.

Mounted loosely upon the revoluble shaft 17 is a collar 18, and engaging the latter is a leaf spring 19. Beyond the collar 18 the shaft 17 is provided with a removable cap 18^a. A spiral spring 20 engages an eye 21 integral with the collar 18. A lever 22 is provided with a bend 22^a, and is disposed below the shaft 17, and connected with the bend 22^a of the lever 22 is a spiral spring 23. A pin 24 supports a weight 25 having substantially a lozenge shape, and the lower end 26 of this weight is pointed, as indicated in Fig. 2. Integral with the weight 25 and extending horizontally therefrom is an arm 27 provided with slots 28, 29. A pin 30 extends across the slot 29 and supports a stylus needle 31, the latter being provided with a jewel 32 made preferably of sapphire.

The stylus needle 31 is provided with a fork 33, and extending through this fork is a bar 34 connected to the fork by aid of a pivot pin 35, see Fig. 3. The bar 34 is provided with an eye 36 and projecting through this eye is a spring 37 made preferably of a single piece of plain wire. This spring is secured to pins 38 mounted upon a block 39, the latter being held rigidly by aid of pins 40, 41. The pin 40 serves, moreover, as a pivot pin for supporting one end of the lever 22, as will be understood from Fig. 1.

The sound box is shown at 42 and is provided with a neck 43 for receiving the horn of the graphophone. A diaphragm bar 44 extends from the diaphragm (not shown) within the sound box, to the drag shoe 45. This drag shoe is made of soft rubber and connected with its lower end is another drag shoe 46 provided with a tongue 47, the latter being secured by a pivot pin 48 to the drag shoe 45. The drag shoe 46 is pivoted to the bar 34, as shown in Figs. 2 and 3. The two drag shoes 45, 46 together constitute a composite semicircular member which partially encircles a friction wheel 49. This friction wheel is provided with flanges 50 upon opposite sides of the drag shoes for the purpose of maintaining the latter in true position.

A bracket 51 extends directly outward from the sound box and a link 52 is mounted by aid of a pivot pin 52^a upon the bracket 51. The link 52 partially supports the revoluble shaft 17, and interposed between

the link 52 and the bracket 51 is a washer 53. The pin 52^a is provided with a head 54 having a considerable bearing surface engaging the bracket 51, which bracket is provided with a plate 55 secured by screws 56 directly to the sound box, for the purpose of supporting the bracket 51. This bracket is also provided with an opening 57 through which extends a sleeve 17^a encircling the shaft 17 and rotating with it, the purpose of this sleeve being to form a suitable bearing for supporting the various revoluble parts carried by the shaft.

Lugs 58, 59 are disposed upon opposite sides of the weight 25 for the purpose of supporting the latter, the pivot pin 24 extending from one of these lugs to the other. A pawl 60 having an L-shape is mounted upon the framework and partially within the path of travel of the arm 27. At 61 is shown a supporting sleeve which is provided at its bottom with a slot 62. A carriage 63 is slidably mounted upon the sleeve 61 and is provided with a guide 64 carried by a guide arm 64^a. A thumb lever 65 is journaled upon the sleeve 61 and is mounted within a slot 68 of the carriage. A cam 66 is connected integrally with the thumb lever 65 and when the latter is turned, the cam is brought into engagement with the weight 26 so as to turn the latter upon the pivot pin 24 as a center. A feed screw shown at 67 and extending through the sleeve 61 operates to propel the carriage 63 in the general longitudinal direction of the feed screw in the manner well understood in this art.

When the device above described is in action, the carriage 63 travels along the sleeve 61. Whenever the carriage is in proper position for the pawl 60 to engage the arm 27, the stylus needle 31 is raised so that the jewel 32 is out of engagement with the sound record 9. This is to prevent the production of harsh and meaningless sounds due to the rotation of the sound record when blank portions of the record are adjacent to the stylus needle. The leaf spring 19 pressed at all times gently against the collar 18 and the tension of the spring 19 against this collar, taken in connection with the pulling tension of the spring 20, also upon it, causes the collar 18 to occupy as nearly as practicable an exact working relation toward the revoluble shaft 17. That is to say, the collar 18 is maintained in such position relatively to the shaft 17 as to reduce to a minimum the lost motion between these parts. The lever 22 being pulled downwardly by the spiral spring 23 and this spiral spring being connected with the weight 25, it follows that the weight 25 must exert a tension upon the spring 23 and consequently upon the spring 20. These springs 20 and 23, by pulling upon the upper end of the weight 25, tend to lower the arm

27 and thus press the stylus needle gently toward the sound record, so as to secure a proper engagement between the record and the jewel 32. The stylus needle is thus allowed considerable freedom of movement and its adjustment relatively to the sound record is such that the vitality and purity of the tones and notes are greatly promoted.

It will be observed that throughout the device above described the factor of lost motion is reduced to a minimum. The jewel 32 necessarily fits against the sound record because of the tension upon the stylus needle 31. The spring 37, by pulling downwardly upon the bar 34, causes its pivotal connection with the stylus needle to transmit movements of the latter without loss of motion. In other words, there is a positive connection between the lower end of the bar 34 and the stylus needle. The shoes 46 and 45, by virtue of the frictional tension produced by the rotating wheel 49, are always kept taut. The net result is that from the jewel 32 throughout the entire chain of parts up to the diaphragm bar 44 there is no loss of motion whatever, and yet all this is accomplished without necessity for any undue pressure upon the sound record. It will be further noted that the pivotal support for the stylus needle is itself movable for the reason that the weight 25 is adapted to rock upon the pivot pin 24. Such being the case, it follows that the stylus needle 31 has a double movement to one swinging movement upon the pivot pin 30 as a center, and another swinging movement upon the pivot pin 24 as a center, this last-mentioned movement being usually greater than the swinging movement upon the pin 30. The great freedom of movement allowed to the stylus needle, I find in practice improves to a great extent the purity and quantity of the tones produced.

The operation of my device is as follows: The motion being communicated by the belt 6 through the driving pulley 5, and the various gears 10, 11, 12, the mandrel 8 and the sound record 9 are rotated. At the time when this occurs, the carriage moves along the tubular sleeve 61 in the manner well understood in this art, the revoluble shaft 17 moving telescopically in relation to its supports. The jewel 32 follows the sound groove and transmits a vibratory movement. This vibratory movement is not transmitted immediately to the diaphragm, but rather to the drag shoes 46, 45, in such manner as to increase and decrease the cohesion thereof relatively to the wheel 49. As in similar machines heretofore used, the motion of the diaphragm is in a measure produced by the rotation of the wheel 49, the vibratory impulses merely controlling the adhesion of the drag shoes upon the wheel. The movable parts being in motion as above described the

weight 25 and the various springs 20, 23 perform the parts allotted to them, and the stylus needle 31 is allowed the greatest liberty in transmitting vibratory impulses to the shoes, thus ultimately affecting the diaphragm.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

The combination of a revoluble shaft, a friction member mounted thereupon, a collar mounted loosely upon said revoluble shaft, a leaf spring engaging said collar, a lever disposed adjacent to said collar, a spring extending from said lever to said collar, and other spring connected with said lever, a

rocking member connected with said last-mentioned spring, a stylus lever pivotally mounted upon said rocking member and adapted to be moved by a sound record, a drag shoe engaging said friction member, and a connection from said stylus lever to said drag shoe.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES MARTELOCK.

Witnesses:

J. A. TYLER,
C. D. BRANDT.

F. W. H. CLAY.
 PROCESS OF MAKING SOUND REPRODUCING RECORDS.
 APPLICATION FILED MAY 23, 1900.

900,706.

Patented Oct. 13, 1908.
 3 SHEETS—SHEET 1.

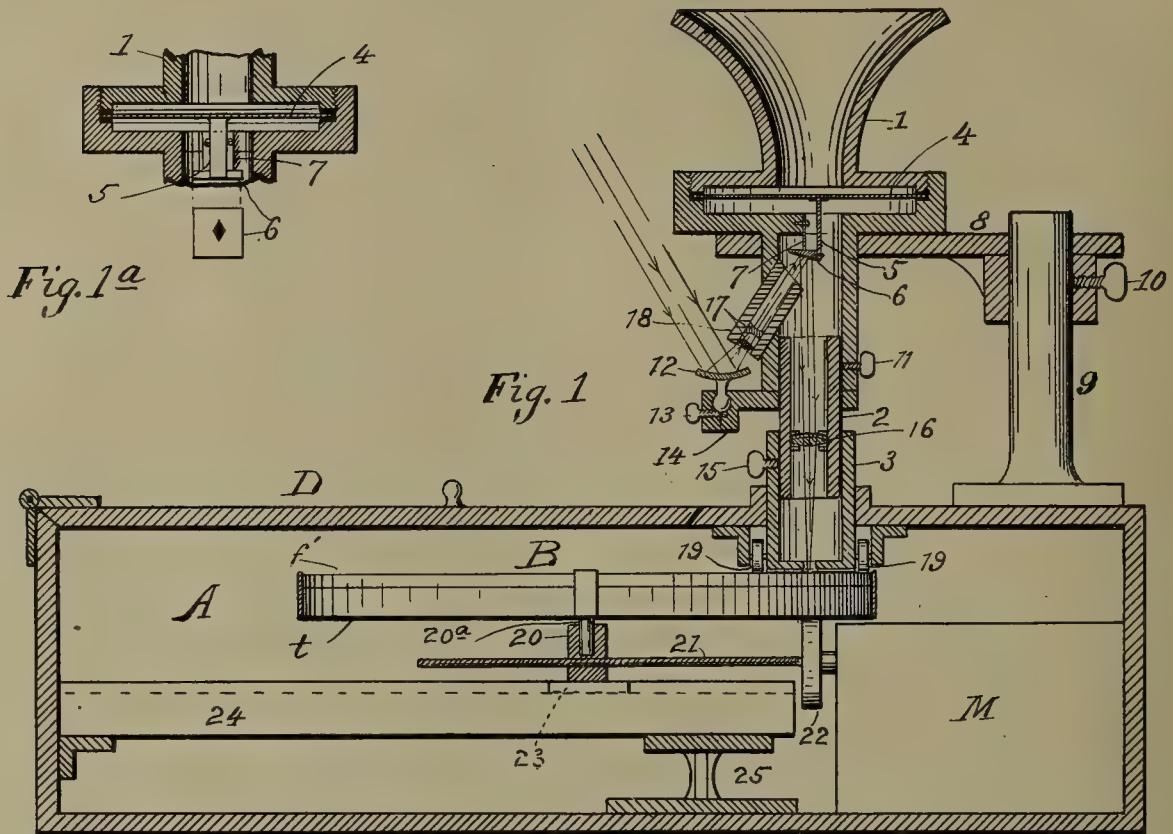
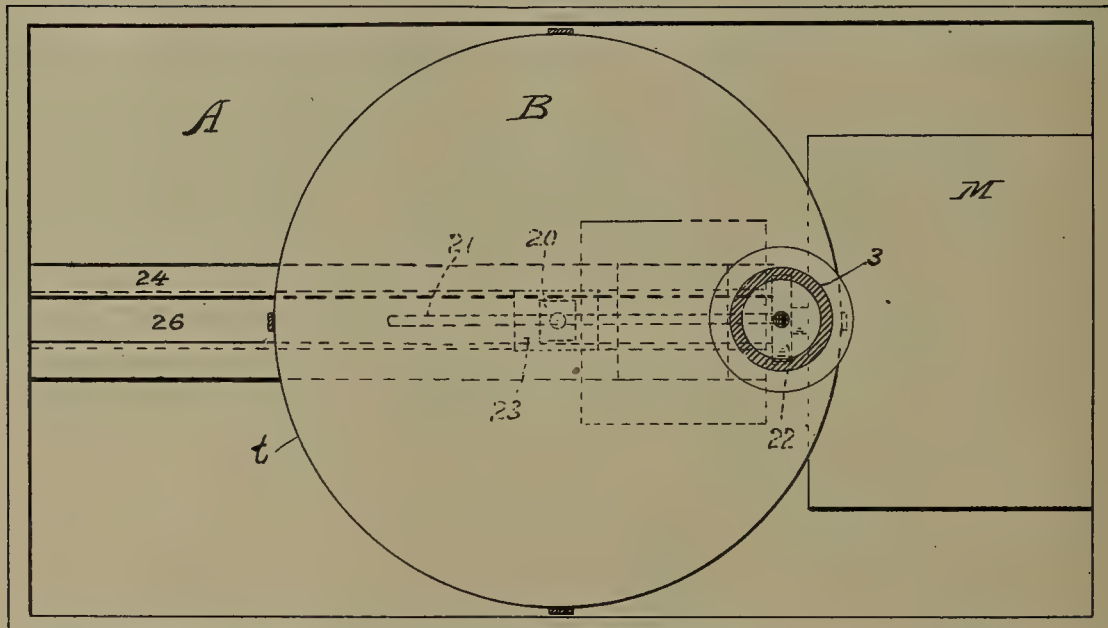


Fig. 2



Witnesses:

Thomas H. Sheard.

Henry G. Ginnell

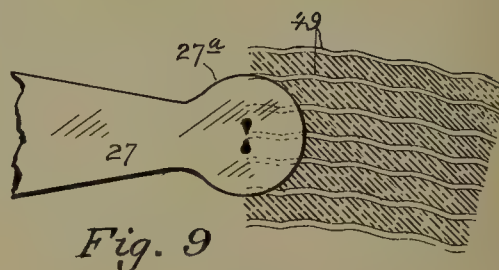
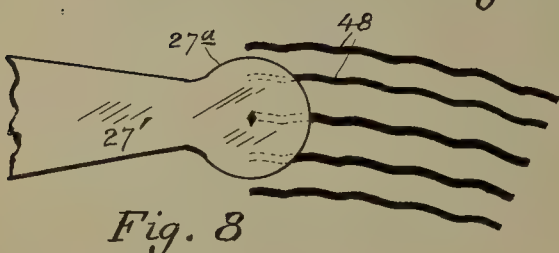
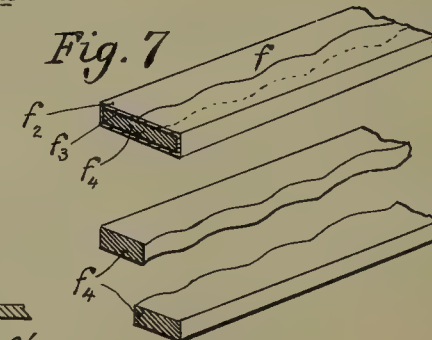
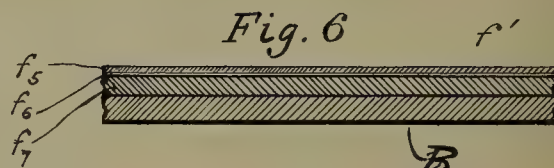
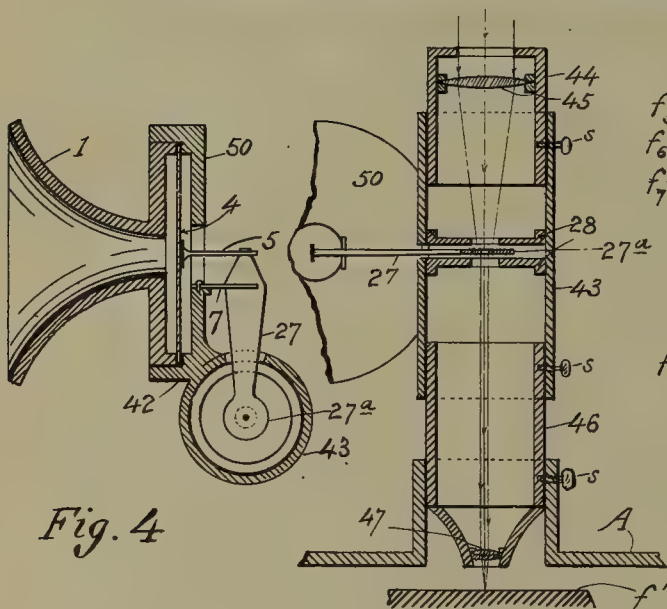
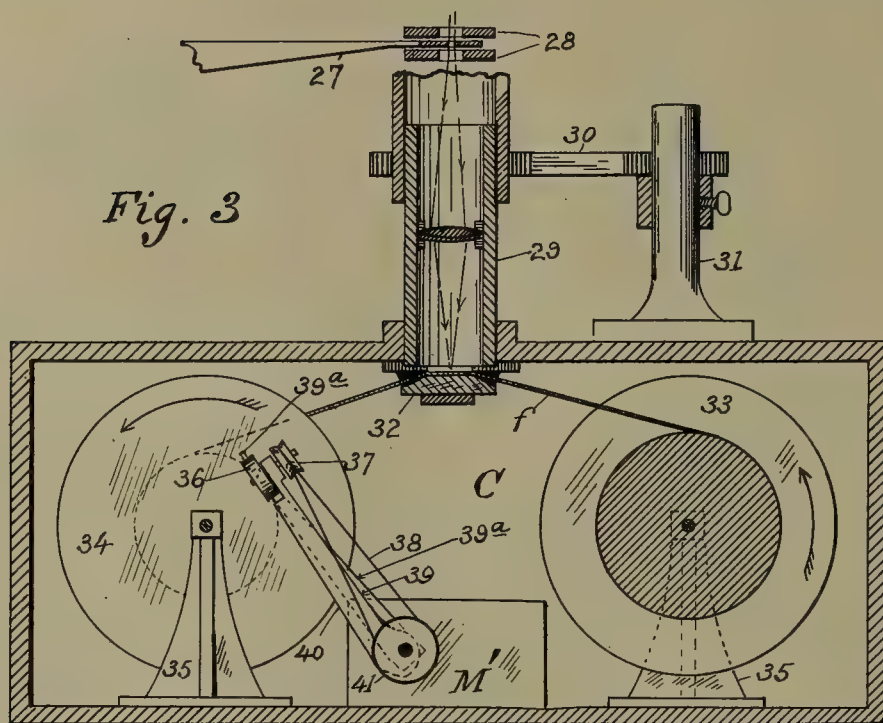
Inventor,

Francis W. H. Clay

F. W. H. CLAY.
PROCESS OF MAKING SOUND REPRODUCING RECORDS.
APPLICATION FILED MAY 23, 1900.

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3 SHEETS—SHEET 2.



Witnesses:
Henry Grinnell
Thomas H. Sherrard.

Inventor,
Francis W. H. Clay

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 APPLICATION FILED MAY 23, 1900.

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Patented Oct. 13, 1908.
 3 SHEETS—SHEET 3.

Fig. 10

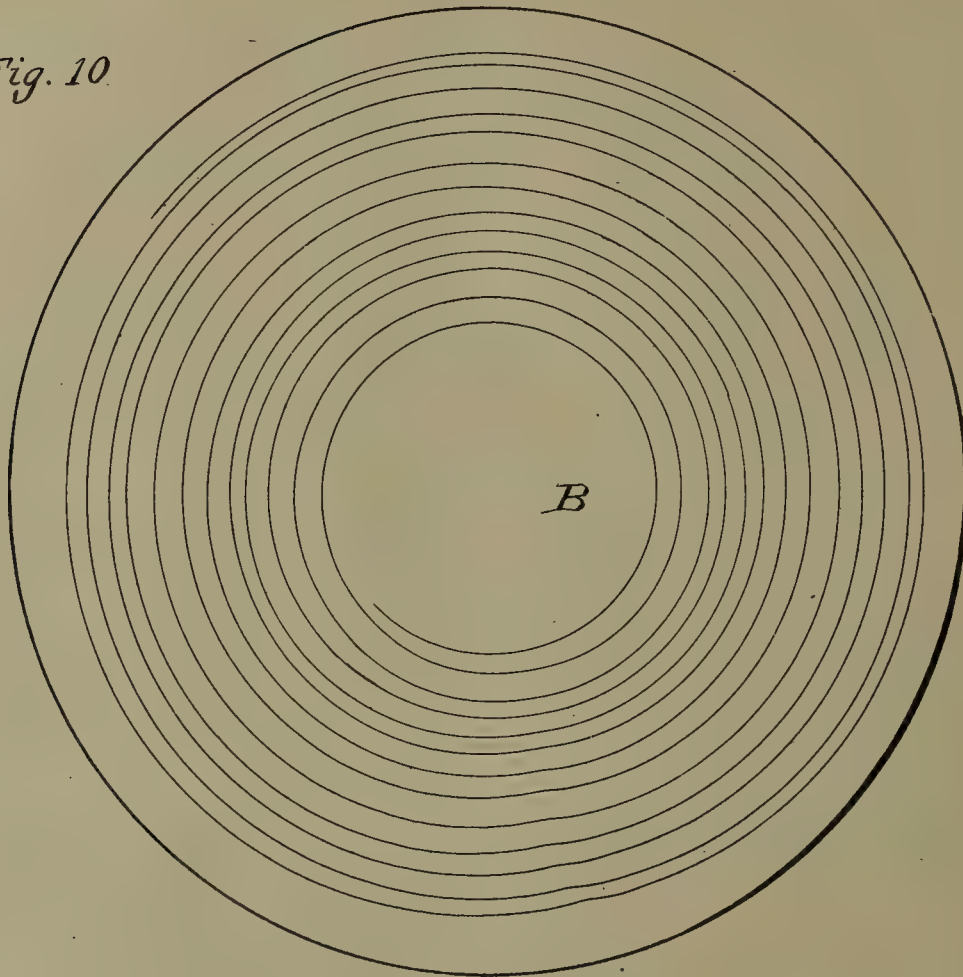


Fig. 11

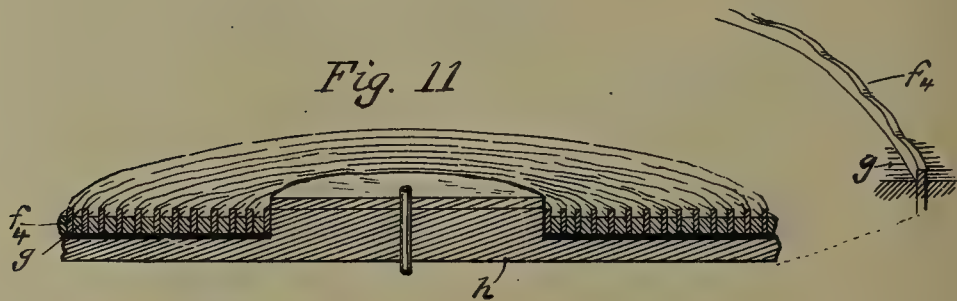
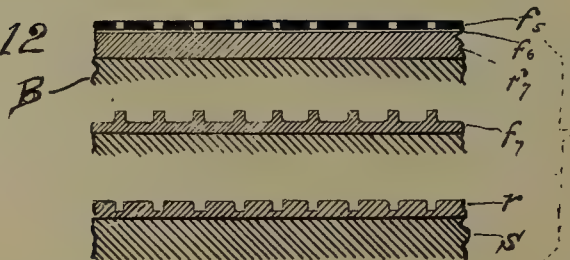


Fig. 12



Witnesses: Henry Grinnell
 Thomas H. Sherrard

Inventor,
 Francis W. H. Clay

UNITED STATES PATENT OFFICE.

FRANCIS W. H. CLAY, OF WHITEHALL, KENTUCKY.

PROCESS OF MAKING SOUND-REPRODUCING RECORDS.

No. 900,706.

Specification of Letters Patent.

Patented Oct. 13, 1908.

Application filed May 23, 1900. Serial No. 17,773.

To all whom it may concern:

Be it known that I, FRANCIS W. H. CLAY, a citizen of the United States of America, residing at Whitehall, in the State of Kentucky, have invented a certain new and useful Process for Making Sound-Reproducing Records, of which the following is a specification.

My invention relates to sound recording and reproduction, and has for its object, primarily, to make reproducing records of the motions of sound waves in a more perfect form than has heretofore been attained, and particularly to avoid the rasping imperfections and buzzing sounds incidentally accompanying the sound reproduction from all the present records used by graphophones, gramophones etc.

My object further, is to gain complete control over the loudness and pitch of the reproduced sounds without diminishing in any degree the accuracy and quality of tone of the same.

The said imperfections in the present sound records result from several conditions necessary and inherent in the processes of producing the records,—notably, 1st., the using of metallic or crystalline materials for the records and for working and duplicating them; 2nd., the employment of graving tools, which are necessarily rough and only approximately of the form they are intended to have; 3rd., the mass and inertia of certain moving parts used in making a trace of the movements of a sound-receiving diaphragm. To avoid these imperfections, my process employs amorphous materials in which to record the sound wave lines and to take an impression of the same for reproducing purposes; and further, I use a light ray as the recording agency and chemical or other similar means both for the recording and for the reduction of the record to a permanent material form for use in reproduction. Thus there is no agency employed, between the sounding diaphragm actuated directly by sound waves and the final reproducing record as used in commerce, which involves weight or inertia to overcome, or which has within itself any necessary source of imperfections, as in all present methods.

The process which I have invented consists broadly, in vibrating a ray of light through the agency of a body actuated by sound waves, passing a light sensitive surface across the field of play of the vibrating ray,

to thereby trace thereon a line corresponding to sound waves, and then developing the photographic line into the form of a groove or raised ridge for reproducing purposes, by purely chemical means.

In the photographic arts two general classes of light-sensitive materials are used, which are typified, respectively, in the common silver bromid dry plate and the "bichromated gelatin" used in photo-engraving drawings.

A thin film of gelatinous or albuminous substance carrying in suspension in its mass such a salt as silver bromid, is affected by an extremely short exposure to light, so as to reduce the stability of the salt, when, in the developing of the substance after exposure, the portions of the film that are affected by light become black by a chemical change and supposedly a deposit of metallic silver,—the unexposed portions remaining transparent after the "fixing" bath. A mass of gelatinous or albuminous substance impregnated with such a salt as ammonium or potassium bichromate requires a comparatively long exposure to light before being sensibly affected. The action of the light on the salt in the presence of the suspending medium is of a character which has a sort of tanning action on the medium, rendering it insoluble in several liquids, such as acetic acid, sulfuric acid, hot water, etc., which yet readily dissolve the same material where it has been protected from the action of the light. In view of these facts, I employ as a means for carrying out my process a compound film composed of a thin top layer of gelatin or albumen containing silver bromid or a similar salt and an under layer of gelatin or albumen or glue containing bichromate of ammonium or potassium or a similar sensitizing salt. Also, in order to be able to develop the top layer when it has been exposed without destroying the under layer I cover the under (bichromate) film with a protecting coat of collodion or such substance. In the exposure in recording the motion of the light ray the bichromate film is not affected, owing to the short duration of time exposed; but the bromid film is affected to render it black on developing. The latter is then treated to any of the common developers, when the path of the light ray thereover becomes a black line, the remaining portions being transparent after the fixing bath. The collodian coat protects the bichromate film both

from the developer and the fixer, and all these operations being carried on in the dark, the bichromate film is still light sensitive, and now has superposed upon it a protecting
 5 black coat where the light ray has played over it in recording sound waves. The film is next exposed a comparatively long time (say 5 or 10 minutes) in strong sun or electric light, and then treated to a bath of the solvent developer, which may be, for example,
 10 glacial acetic acid cold. This dissolves away the upper film of gelatin, the collodion coating and the unexposed portions of the bichromate gelatin. The sound record is then
 15 indicated by the difference in the thickness or elevation between the parts of the film which are light struck and those which are not exposed, and if the unexposed portion be all dissolved away the resulting sound record
 20 takes the form of the edge of the film cut along the dividing line between exposed and unexposed parts.

In making sound records in one form hereinafter to be described, I may proceed by
 25 placing the bichromate gelatin directly on the bromid gelatin after the latter has been exposed and developed. Thereupon, the second exposure being made from beneath, the solvent developer being applied to the
 30 outersurface leaves the light struck portion,—*i. e.* the portions under the transparent parts of the bromid film, as raised ridges, superposed on the bromid gelatin.

After the sound photograph has been made
 35 it may be reproduced in relief in gelatin or glue or similar substance by printing in the sun and dissolving out, as is done in photo-engraving.

The form in which the photographic surface is arranged is not material to the process. But I prefer, for cheaper records where accuracy is not the sole consideration, to make the record in the form of a ridge or a grooved line arranged spirally on a flat plate.
 45 For more accurate work I make the compound film in the ribbon form, as illustrated in the accompanying drawing at Figure 7.

For carrying out the process and the manipulation of the film and of the light ray I have invented the apparatus illustrated in the accompanying drawings, which drawings also illustrate the steps of the process. And the process will be explained in detail in the description of the structure and use of the
 55 apparatus.

Fig. 1 represents my preferred form of exposing box, telescope and actuator, shown in section. Fig. 1^a is a vertical section, at right angles to that of Fig. 1, through the actuating diaphragm and its housing, showing the support of the mirror. Fig. 2 is a plan inside the dark box, with a plate in position, and a cross section of the telescope. Fig. 3 is a vertical section of an exposing box for
 65 recording on the ribbon form of the film.

Fig. 4 is a section through another form of actuator and its telescope. Fig. 5 is a vertical section through the telescope. Fig. 6 is a partial section of the compound film carried on a plate. Fig. 7 shows two perspective and sectional views of the ribbon form of the film, in two stages of development. Fig. 8 illustrates the head of the lever arm for actuating the light ray, and the trace of the light ray, as arranged when it is desired to
 75 produce a groove in the bichromate gelatin. Fig. 9 illustrates the same as arranged to give a raised ridge in the bichromate gelatin, to be used as a patric die in stamping out duplicates. Fig. 10 shows a flat plate with a
 80 sound photograph traced upon it in spiral form. Fig. 11 is a perspective view in section of the disk formed by winding the ribbon of Fig. 7. Fig. 12 shows in section, at two stages of development, the plate form of the double film, and the reproducing plate stamped out therefrom, below.

Considering the cost of producing duplicate records I prefer the form of the apparatus shown in Figs. 1 and 2. 90

A light tight box A contains a motor M having a contact or brush-wheel 22 on a horizontal shaft which has a fine screw extension, 21. This screw works in a block 20 which has a base 23 mortised in and sliding freely in
 95 a groove 26 in a horizontal guide-bar 24 supported as shown at 25. The traveling block 20 has a socket which receives the center pin 20^a of a revolving table *t*. The table *t* carries the plate B having the sensitive film *f'*
 100 (shown in Fig. 6). The table and plate are revolved by the brush wheel 22 and are kept in contact therewith by rollers 19. The box A has a door D for introducing the sensitive plate. On top of the box A is stanchion 9
 105 with an adjustable arm 8 which carries the telescope and actuator for the light ray. In the form of this figure, a sound receiver 1 screws into and forms part of a circular housing containing a vibrating diaphragm 4,
 110 which may be of glass or mica, held between elastic rings. At the center of the diaphragm is a thin aluminum strut 5 to actuate a mirror 6. On one side of the lower opening of the housing is attached a thin flat
 115 spring 7 which carries on its outer end a small surface mirror 6 attached at its middle. Thus as the diaphragm 4 vibrates under the influence of sound waves entering the receiver 1 the mirror receives an angular vibration about its middle as a flexion axis. The face of the mirror has a black or a white spot, preferably diamond-shaped, as shown at Fig. 1^a. (If it is black its image on the plate *f'* will make a clear line photographic trace; if
 125 silvered, a black line trace, for a purpose hereinafter set forth. Or, the sectional form of the ray may be controlled by an opening, before striking the mirror.)

The diaphragm housing has a tubular ex- 130

tension below which telescopes over a tube 2 which again slides in a tube 3 set in the top of the box A. All the parts have set screws for adjusting. Through the side of the tube 5 extends a small tube 18 carrying condensing lenses 17 which project rays of light on the center of the mirror 6 and through the lens 16. The sunlight is collected and projected into the tube by the concave mirror 12 held 10 by a universal joint in the head 14 supported by the telescope as shown. The ray of light then is reflected downwards and is focused by a lens 16 to the fine image on the surface of the moving sensitive film f' . It will be 15 plain that by arranging the distance from the mirror to the film f' the movement of the focus point of the ray of light may be given any desired amplitude of vibration, while the lens 16 will reduce the image of the spot on the mirror 6—that is, the cross section of the 20 vibrating ray—to any desired degree or size. Thus both the amplitude of the lateral vibration on the recording surface and the size and brilliancy of the recording beam of light are under complete control. As is clear 25 from the figure, the ray of light will vibrate to and fro in a line radial to the disk B, while at the same time the said disk rotating gives the impinging point of the light ray a resultant sinuous motion with respect to the circumference of the plate B and proceeding in a spiral path over the surface about the center of the plate,—the screw 21 dragging the 30 table and plate laterally under the focus of the telescope as the revolution continues. An illustration of the course over the plate is shown at Fig. 10.

The actuator shown at Fig. 4 will sometimes be used. The small flat spring 7 supported on the diaphragm housing carries an 40 arm 27 of light material as aluminum. At its inner end it is attached to a flexible strut 5 made fast to the diaphragm 4. At its outer end, on the longer lever arm, is a flat 45 head 27^a with a small hole (preferably diamond shaped), and this head and arm extend through a slit in the side of the telescope 43 and play freely between the two disks 28 which are open at the center as shown. The 50 light is collected and concentrated to the desired degree on the vibratory head 27^a by a lens 45 in the tube 44, and after passage through the opening in the head 27^a of the arm 27 the rays are focused by the lens 47 55 on the surface of the moving sensitive film f' .

The plate B and the film f' are shown in partial section at Fig. 6. The bichromate film f^7 is placed on metal or glass and covered with a collodion film f^6 and upon this is placed 60 the bromid film f^5 . The form of the opening in the head of the arm 27 is best shown at Fig. 9, in using which the line left on the plate is unexposed, while the rest of the surface will have been all subjected to the action 65 of light. (See Fig. 12.)

When developed the film f^5 will have a laterally sinuous spiral line left transparent. On exposure to light again the portions of the bichromate gelatin under this will be light 70 struck and become insoluble, so that when the whole is treated to acetic acid the top film f^5 , the collodion coat f^6 and the unexposed portions of the bottom (bichromate) film f^7 will dissolve away, leaving the form shown in section (f^7). This is dried and 75 hardened and then used as a patrix die to stamp into softened celluloid for example, as at r , leaving the sound record in the form of a groove spirally arranged on the plate or disk S. 80

The more accurate form in which to make the record is by the use of a sensitive ribbon, instead of the plate film. This is shown at Fig. 7, and is manipulated by the apparatus of Fig. 3. The dark box C contains a spool 85 or roller 33 carrying the sensitive ribbon, and a spool or roller 34 to receive it. The ribbon passes over a support 32 under the vibrating ray of light and winds on the spool 34, which is driven by a brush wheel 36 carried on a 90 pivoted arm 39 and driven by a pulley 37 and cord 38 from the pulley 41 of the motor M'. The arm 39 is pivoted on the shaft of the pulley 41 and has, integral with it, a finger 39^a which extends inside the spool 34 and 95 rests on the surface of the ribbon already wound thereon. It stands parallel and opposite to the arm 39, so that as the ribbon winds on the spool the arm 39^a rises, carrying also the arm 39 outward, keeping the point 100 of contact of the driving wheel 36 always opposite to the last layer of the ribbon and winding the ribbon on the spool at a constant rate, whatever may be the diameter of the coil on the receiving spool. Either form of 105 telescope and actuator may be used with either form of exposing box and film.

The sensitive ribbon is made similar to the sensitive film on the plate heretofore described, save that it will be more convenient 110 in making to coat both sides of the bichromate film with the collodion and the bromid gelatin.

Referring to Fig. 7: the thick film f^4 is the bichromate gelatin; it is thinly coated with collodion, f^3 , for protection. Outside this is 115 a thin film of the silver bromid gelatin, f^2 . Upon exposure and development the trace of the ray of light (when the form of the actuator head of Fig. 8 is used) results as a fine black line along the middle of the ribbon, as 120 shown. When re-exposed to effect the bichromate film the latter becomes insoluble all except the portion protected by the black medial line, which part readily dissolves in the solvent developer. Consequently, in the 125 bath of acetic acid the bichromate ribbon is severed along the line representing the sound waves by the dissolving away of the protected gelatin. Now one of the halves of the severed ribbon is arranged for sound reproduc- 130

tion as shown in Fig. 11, where the base h is a flat disk having a hub. Around this the ribbon is wound in layers with layers of packing of less width than the ribbon, between them, so that the gelatin ribbon f^1 stands a little above the general surface, forming, when completed, a spiral ridge on the disk h having its upper edge undulatory to correspond to the sound waves. When hardened this may be used as a patrix die to stamp into softened rubber or celluloid for commercial use; or it may be reproduced in various ways.

It is clear that the packing between the layers of the gelatin ribbon might as well be made wider,—*i. e.*, higher from the base disk, than the ribbon itself, so that the whole will present a spiral groove whose bottom is the edge of the ribbon, shaped in correspondence with sound waves.

The terms "sound photograph" and "phonophotographic record" used herein will be understood to indicate the trace of the vibrating spot of light over the surface of the moving bromid film, after development thereon, when the line referred to is either a black opaque line or else a clear line in the gelatin,—depending on whether the recording spot is lighted or is black.

Now the sound photograph may be reproduced in raised or depressed form in several ways: when it is made as a dark line trace or "negative", I may expose under it directly a common bromid film and make thereby a "positive" or clear line trace. This being developed in oxallate or other non-metallic developer, treated to dilute sulfuric acid, dried thoroughly and then steamed; whereupon the (clear line) trace will swell and form a ridge, which can be baked and hardened and used as a patrix die, from which we may stamp out duplicates in the groove form. Again, I may use a clear line photophonographic record and reverse it over a plate covered with thick bichromated gelatin and after printing thereon dissolve out the unexposed portions of the said bichromate gelatin, leaving the record again in the form of a standing ridge. On using this as a patrix die and stamping out duplicates in celluloid the record will be re-reversed and take the form of a groove in the duplicate, now again in obverse and ready for commercial use.

The ways of duplicating, and of reducing the photophonographic record to a tangible material form for reproducing the sound are given only to illustrate the breadth of my invention, being parts thereof, and while they are alternate forms of procedure in my process I do not limit myself to any one or to all of them.

The apparatus herein described, which forms another part of my invention, I have presented for patent in my application No. 158,311 filed May 22/03, and the same there-

fore forms no part of the invention covered by claims herein, but—

Having thus described my invention, what I claim and desire to secure by Letters Patent is the following:

1. The process of making sound reproducing records by photographically recording the movements of a sound-actuated body and photo-etching the said graphic record to produce an undulating surface corresponding in form to the sound waves recorded.

2. The process of making sound reproducing records by vibrating a ray of light in consonance with the movements of sound waves, moving a light-sensitive film across the field of play of the said ray and reducing the resulting trace of the said ray by chemical means to material form as an undulating surface in amorphous material.

3. The process of making a reproducing sound record by moving a ray of light in consonance with the vibrations of sound waves, translating a light-sensitive material across the field of play of the said ray, developing, and by chemical means changing the relative elevation of the material along the said trace on the sensitive surface thereof.

4. The process of making sound reproducing records consisting in vibrating a ray of light in consonance with the motions of sound waves over a moving sensitive surface, developing the photographed line thus formed, exposing under the photograph amorphous material capable of being rendered insoluble by the action of light and dissolving out the unexposed and soluble portions of the same, to leave an undulating surface.

5. The process of making sound reproducing records which consists in exposing successive portions of a light-sensitive film to the action of a ray of light vibrated in consonance with the movement of sound waves, developing the same to reduce the trace of the ray to an opaque line, exposing under this film a second film rendered insoluble where light-struck, and dissolving out the unexposed portions of the said second film, whereby an undulating surface in the form of the path of the light ray is produced in the said second film.

6. The process of making sound reproducing records by photographing upon a light sensitive film the movements of a ray of light vibrated by the agency of a sound wave actuated body, developing the resulting photographic trace, exposing beneath it a film capable of being rendered insoluble by the action of light thereon, dissolving away the unexposed portions of the same under the sound record trace, to form an undulating surface, and reproducing the resulting sound wave forms by impressing the same into soft material such as celluloid.

7. The process of making sound reproducing records which consists in vibrating a ray of light by a sound-actuated body, translating a light-sensitive ribbon under the point of incidence of the said ray to trace an undulating photographic line thereon, exposing under this record a ribbon of bichromated gelatin, dissolving away the unexposed portions of the latter, so as to divide the said ribbon into parts having their edges undulating in the form of sound waves.

8. The process of making sound reproducing records which consists in exposing successive portions of a light-sensitive film to the action of a ray of light vibrated in consonance with the movements of sound waves, developing the same to produce an opaque line on the trace of the ray, exposing under this film a second film rendered insoluble where light-struck, dissolving out the unexposed portions of the said second film so that the form of the edge of the path of the ray of light is imparted to an undulating surface representing sound waves, and winding this film about a center so that the said edge is arranged spirally with the volutions of the edge approximately in a plane.

9. The process of making sound reproducing records which consists in vibrating a ray of light by a sound-actuated body, translating a light-sensitive ribbon under the point of incidence of the said ray to trace an undulating photographic line thereon, exposing under this record a ribbon of bichromated gelatin, dissolving away the unexposed portions of the latter to sever the ribbon into parts having their edges in the form of sound waves, and winding the ribbon into a disk with the edge of the ribbon forming a spirally arranged surface with undulations in the plane vertical to the plane of the disk.

10. The process of making sound-reproducing records which consists in vibrating a ray of light by a sound-actuated body, translating under the point of incidence of said ray a compound sensitive ribbon composed of a top layer of silver bromid emulsion and an under layer of bichromated gelatin the latter being protected by a skin of collodion, developing the top film, re-exposing to effect the under film, dissolving away the top film and the unexposed portions of the under film so as to sever the under film along the line of the trace of the light ray, and winding the resulting wavy-edged ribbon with alternate layers of packing, into a disk with the edge of the ribbon forming a spirally arranged surface on the face plane of the disk, the undulations in the form of sound waves being in a plane vertical to the disk.

11. The process of making sound reproducing records consisting in vibrating a ray of light falling on a sensitive film in consonance with sound waves, developing the photograph thus formed, exposing under the photograph a strip of amorphous material capable of being rendered insoluble by the action of light, dissolving out the unexposed and soluble portions of the amorphous material, winding the strip thus formed into a spiral with the undulating edge corresponding to the sound waves extending in one direction, and impressing in or upon plastic material the said undulating spirally arranged edge of the strip.

12. The process of making sound reproducing records which consists in exposing successive portions of a light-sensitive film to the action of a ray of light vibrating in consonance with the motions of sound waves, developing the same to produce an opaque line, exposing under this film a second film capable of being rendered insoluble by the action of light, dissolving away the unexposed portions of said second film to form the material under the edge of the path of the ray of light into an undulating surface having the shape of the sound waves, winding this film about a center so that the said edge is arranged spirally, lying in approximately a plane, and then impressing the resulting record disk into soft material to make commercial records in the form of a plate having a spirally arranged surface with the undulations in a plane vertical to the plane of the plate.

13. A photophonogram having an undulatory operating surface, the undulations thereof corresponding to sound waves, and composed of amorphous material rendered practically insoluble in water by the action of light.

14. A photophonogram having a continuous spirally arranged undulatory operating surface, the undulations thereof corresponding to sound waves, and composed of amorphous material rendered insoluble by the action of light.

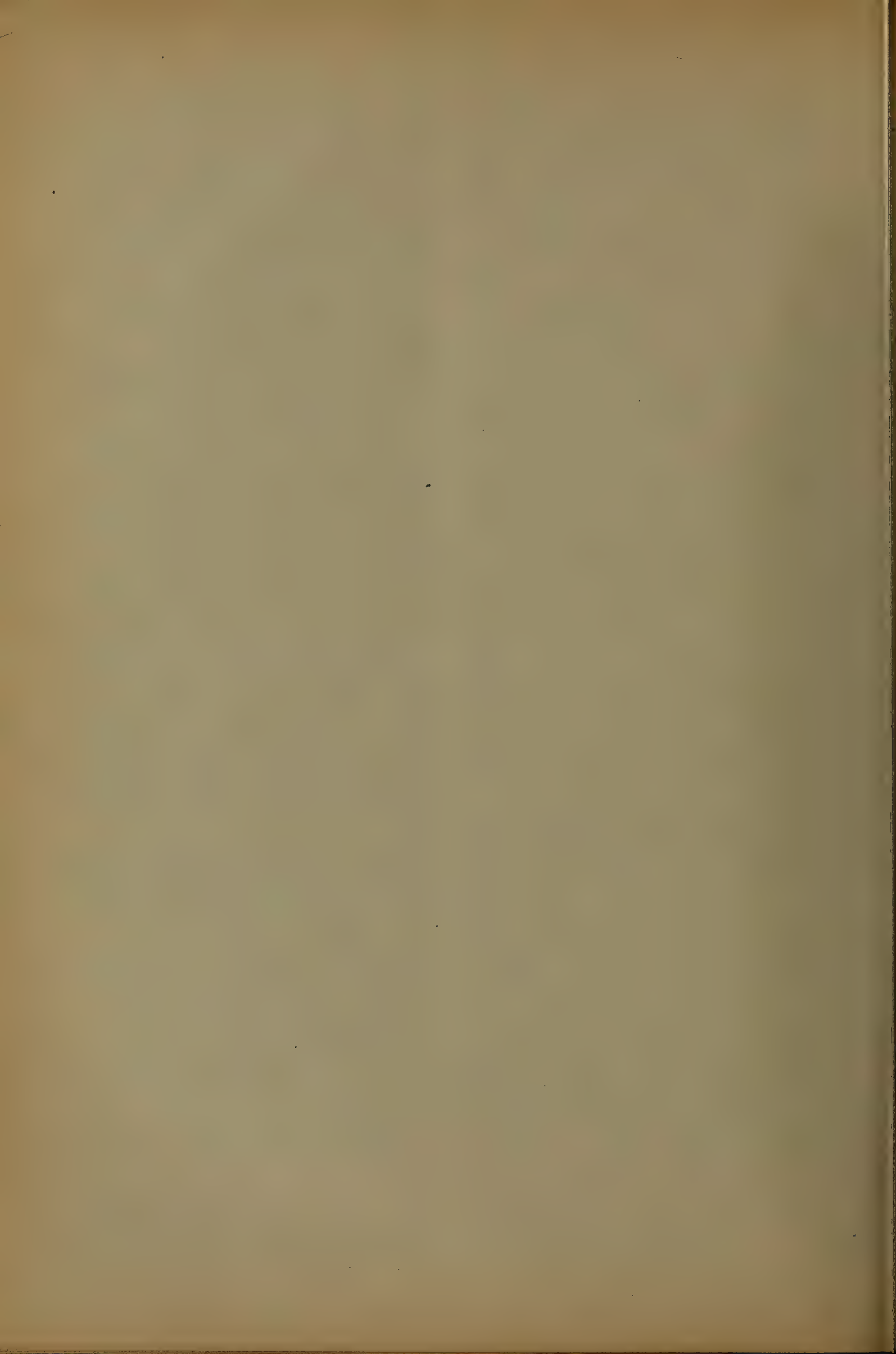
15. A surface of amorphous material rendered insoluble by the action of light having cut therein by tracing with a sound actuated ray of light and a developer a spirally arranged portion having an undulating surface corresponding to sound waves.

In testimony whereof, I hereunder sign my name in the presence of two witnesses.

FRANCIS W. H. CLAY.

Witnesses:

DANIEL WILSON,
CHAS. H. URBAN.



I. W. NORCROSS.
 AUTOMATIC PHONOGRAPH APPARATUS.
 APPLICATION FILED AUG. 9, 1907.

900,876.

Patented Oct. 13, 1908.
 2 SHEETS—SHEET 1.

Fig. 1.

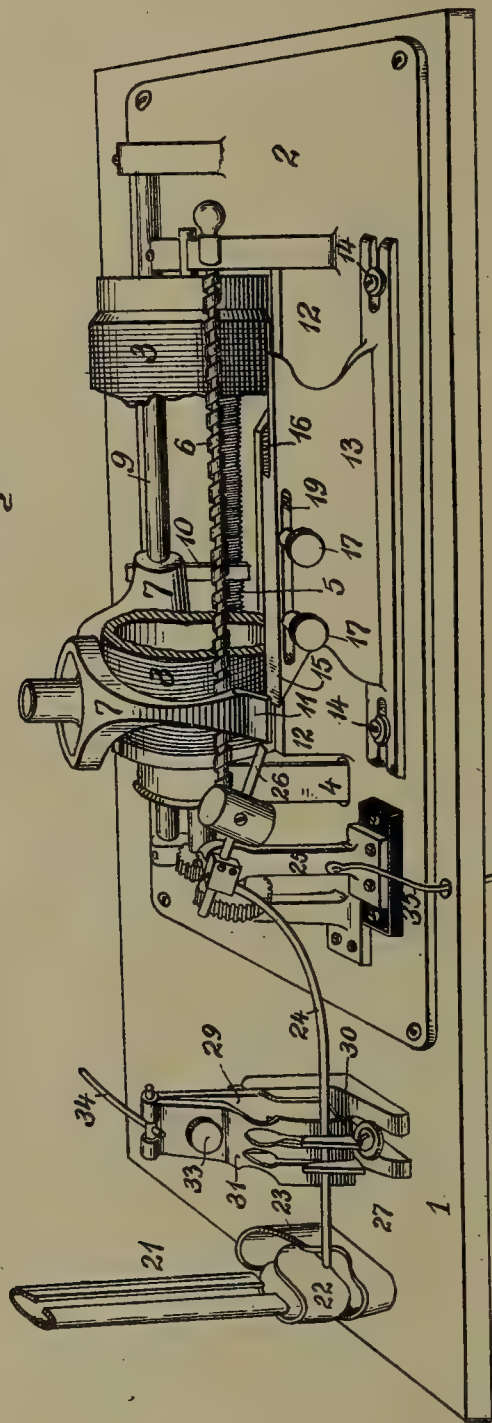


Fig. 2.

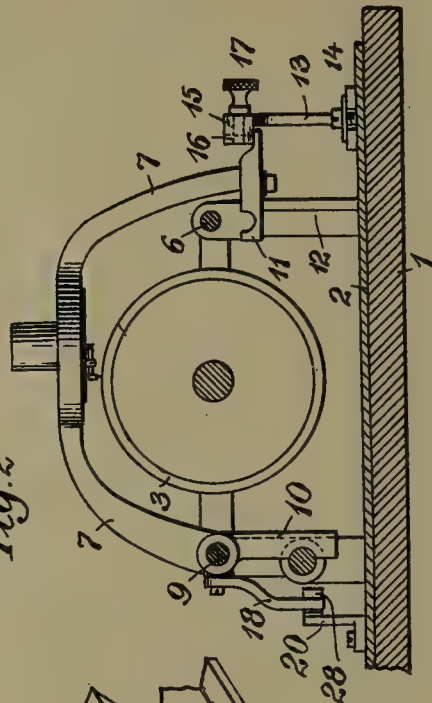


Fig. 4.

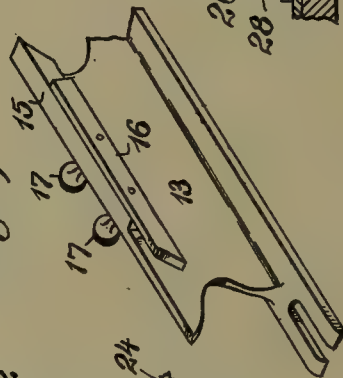
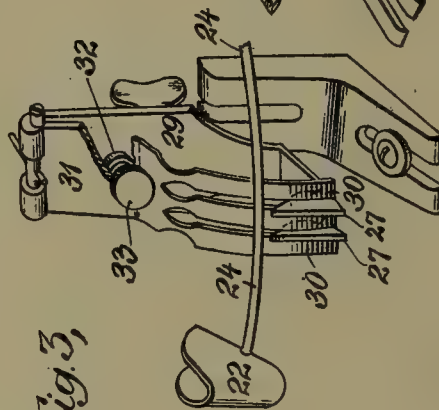


Fig. 3.



WITNESSES:

H. Edmunds.
S. Bartlett

INVENTOR

Isaac W. Norcross

BY

H. Edmunds.
 ATTORNEY

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 AUTOMATIC PHONOGRAPH APPARATUS.
 APPLICATION FILED AUG. 9, 1907.

900,876.

Patented Oct. 13, 1908.
 2 SHEETS—SHEET 2.

Fig. 6.

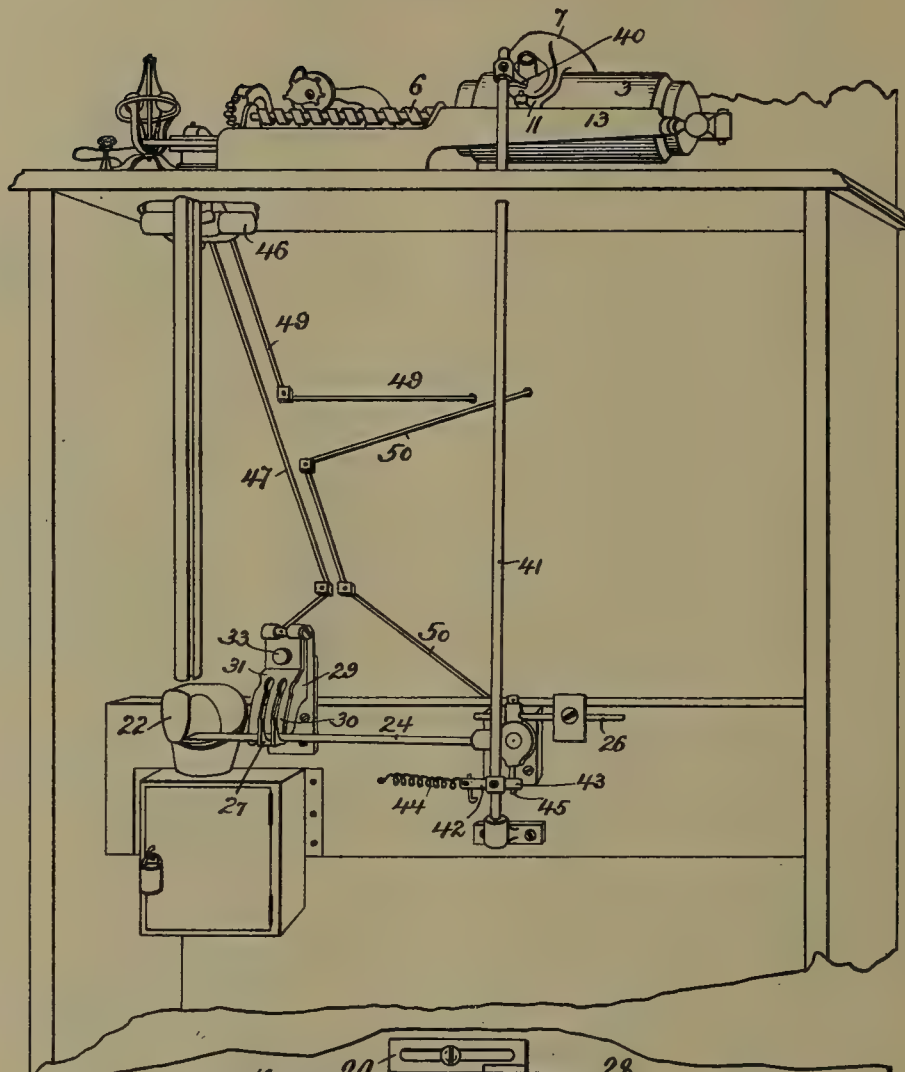
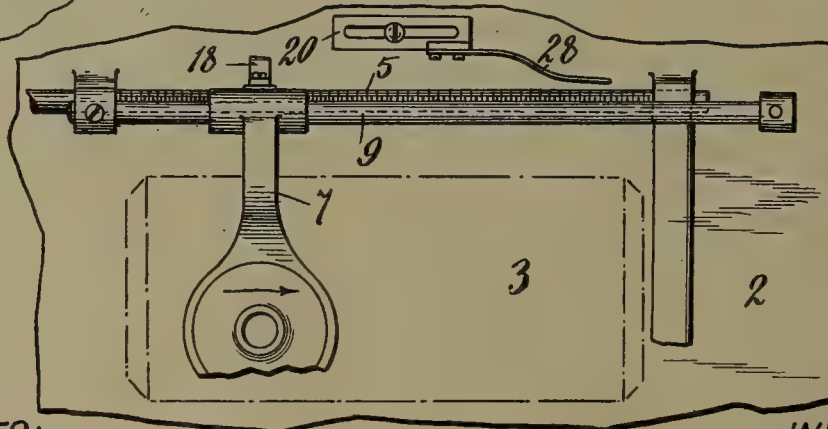


Fig. 5.



WITNESSES:

H. Edwards.
S. H. Marcus.

INVENTOR

I. W. Norcross

UNITED STATES PATENT OFFICE.

ISAAC W. NORCROSS, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO ELLSWORTH A. HAWTHORNE, OF PHILADELPHIA, PENNSYLVANIA.

AUTOMATIC PHONOGRAPH APPARATUS.

No. 900,876.

Specification of Letters Patent.

Patented Oct. 13, 1908.

Application filed August 9, 1907. Serial No. 387,782.

To all whom it may concern:

Be it known that I, ISAAC W. NORCROSS, a citizen of the United States, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Automatic Phonograph Apparatus, of which the following is a specification.

One object of my invention is to insure the starting of the mechanism when a coin is deposited in the slot and the stopping of said mechanism after the reproducer has traveled to the end of the record and has been returned to the starting point again.

A further object is to effect positive engagement of the reproducer carriage with the feed and return screws and positive retention of such engagement during the entire time of travel of the reproducer carriage in its forward or backward movements; and a still further object is to readily regulate the length of travel of the carriage to accord with the length of the record with which the device is equipped.

These objects I attain in the manner hereinafter set forth, reference being had to the accompanying drawings which show the preferred embodiment of the invention, and in which

Figure 1 is a perspective view of a portion of a coin-actuated phonograph; Fig. 2 is a view of the same, partly in transverse section and partly in elevation; Fig. 3 is a view showing, detached from each other and partly broken away, the members of the contact device whereby the electric circuit is closed or opened; Fig. 4 is a perspective view of the rear side of the device for locking the reproducer carriage in engagement with the feed or return screw; Fig. 5 is a plan view of a portion of the mechanism, and Fig. 6 is a perspective view showing the application of certain features of my invention to a phonograph instrument of a somewhat different type from that shown in Fig. 1.

Referring in the first instance to Figs. 1 to 5 of the drawing, 1 represents a support of any appropriate character to which is secured the bed-plate 2 of the phonograph instrument, this bed-plate having suitable standards providing bearings for the spindle which carries the phonograph record 3. This spindle is driven by a belt 4 from an electric motor suitably located and connected by proper gearing to the main feed screw 5

and return screw 6, whereby the reproducer carriage 7 is caused to move forwardly or backwardly. The reproducer carriage is pivotally mounted upon a guide rod 9 and has an arm 10 which carries a half nut for engaging the forward feed screw 5 and another arm 11 provided with a half-nut for engaging the return screw 6, the half-nut of the arm 10 being in engagement with the feed screw 5 when the reproducer carriage is lowered so that the reproducer stylus will engage with the record, as shown in Fig. 2, and the half-nut of the arm 11 being in engagement with the return screw 6 when the reproducer carriage, after having completed its forward movement, is lifted so as to free the reproducer stylus from the record preparatory to the return movement of the carriage.

In front of the record holder is a longitudinal bar 12 upon which the arm 11 is supported when the front portion of the reproducer carriage is depressed so as to bring the reproducer stylus into engagement with the record, as shown in Fig. 2, and in front of this bar is a locking device whereby the reproducer carriage is firmly held in either its raised or lowered position during its forward or backward traverse. This locking device consists of a vertical plate 13 having a base which is slotted at each end for the reception of confining screws 14 whereby the locking device can be adjusted longitudinally in respect to the record, as may be desired. The plate 13 has a flanged upper portion 15 and to the inner face of said flange is secured a bar 16 by means of set screws 17 passing through a slot 19 in the plate 13, whereby the bar 16 can be adjusted longitudinally in respect to the flanged top of the plate 13, and can thus be caused to project to any desired extent beyond one end of said flange, as shown in Fig. 1.

When the reproducer carriage is in operative relation with the record, as shown in Fig. 2, the forward end of the arm 11 projects beneath the bar 16 and flange 15 of the plate 13 and the reproducer is thereby prevented from rising from the record, and at the same time the half-nut of the arm 10 of the reproducer carriage is held firmly in engagement with the forward feed screw 5, this condition of affairs continuing until the arm 11 passes beyond the projecting end of the bar 16, and is therefore free to rise.

Secured to and depending from the rear

side of the carriage 7 is an arm 18 (Figs. 2 and 5) and mounted on the support 1 is a bracket 20 carrying a leaf spring 28 which extends into the path of movement of the end of arm 18. Bracket 20 is adjustable parallel to the axis of the record by being provided with a slot and being secured to the support by a screw passing through this slot, as shown in Fig. 5. As the arm 11 nears the projecting end of bar 16, arm 18 engages spring 28 and puts the same under tension so that the spring tends to rock the carriage on rod 9 in the direction to raise arm 11. Thus, as soon as arm 11 is free of the end of bar 16, the carriage will be rocked to free the half-nut of the arm 10 from engagement with the forward feed screw 5, and bring the half-nut of the arm 11 into engagement with the return screw 6, and during the return movement of the carriage the arm 11 will bear upon the top of the bar 16 and flange 15, which will thus serve to support the reproducer carriage in its raised position and maintain the arm 11 in positive engagement with the return screw 6.

The rear end of the bar 16 is beveled, as shown in Figs. 1 and 4, and if the spring 28 does not lift the arm 11 to its full height, the beveled end of the bar will engage said arm and effect the completion of the movement. When the arm 11 reaches the end of the flange 15 on the backward movement of the reproducer carriage, it drops therefrom, owing to the preponderance in weight of the overhanging front portion of said carriage, and the original conditions are thereby restored, the carriage being free from the control of the return screw and again placed under control of the forward feed screw 5. At this time it becomes necessary to stop the operation of the motor whereby the record-carrying spindle is operated, otherwise the device would operate continuously. The motor was originally started by dropping a coin through the guide 21, the coin dropping into a cup 22 and then rolling therefrom through a funnel 23 into a suitable receptacle. The cup 22 is carried by one arm 24 of a lever pivoted to a standard 25 on the bed-plate of the phonograph and having a counterweighted arm 26, which projects into the path of the arm 11 of the reproducer carriage when the same drops from the end of the flange 15 of the locking plate 13. When said arm 11 is in its lower position, however, the lever arm 26 can project above the same, and this position is assumed by it when the impact of the coin falling into the cup 22 depresses the arm 24 of the lever. By this movement said arm 24 is forced between a pair of fingers 27 on a plate 29 and a series of spring fingers 30 forming part of a plate 31 which is pivotally mounted on the upper end of the plate 29 and is acted upon by a spring 32 interposed between the two plates, as

shown in Fig. 3, and tending to push the plate 31 outwardly so as to press its spring fingers 30 towards the fingers 27 with a degree of force determined by the adjustment of a set screw 33, which passes through an opening in the plate 31 and screws into a threaded opening in the upper portion of the plate 29.

To the plate 29 is connected a wire 34 forming part of an electric circuit containing the driving motor for the record-carrying spindle, another wire 35, forming part of said circuit, being connected to the standard 25. When, therefore, the lever arm 24 is forced down between the fingers 27 and the spring fingers 30 an electrical connection is established between the wires 34 and 35, and the electric circuit through the motor is completed, the frictional hold of the fingers 27 and 30 upon the lever arm 24 being sufficient to retain the parts in this position after the coin has dropped from the cup 22. When, however, at the end of the return motion of the reproducer carriage, the arm 11 drops from the flanged upper end of the locking plate 13, it strikes the lever arm 26 and depresses the same so as to raise the arm 24 free from contact with the fingers 27 and 30, thereby opening the circuit through the motor and stopping the operation of the same until another coin has been deposited in the cup 22.

The adjustment of the bar 16 in respect to the flanged upper portion of the locking plate 13 provides for the retention of the reproducer carriage in operative relation with the record throughout any desired length of travel of said carriage, whereby such extent of travel can be accurately gaged to suit the length of the record with which the device is equipped.

In Fig. 5 I have illustrated the circuit opening and closing devices in connection with a phonograph of somewhat different type from that illustrated in Figs. 1 to 4. In this embodiment of my invention the arm 11 of the reproducer carriage 7, on the forward movement of said carriage, when the arm is depressed, passes beneath an arm 40 on a vertical shaft 41, which is mounted in suitable bearings in the cabinet carrying the phonograph instrument, the lower end of said arm 41 having two arms 42 and 43, the former acted upon by a spring 44 and the arm 43 being adapted to act upon a third arm 45 of the lever which carries the circuit closing arm 24 and the counterweighted arm 26. On the rearward movement of the reproducer carriage its arm 11 strikes the arm 40 and turns the shaft 41 so as to cause its arm 43 to strike the arm 45 and thereby lift the arm 24 out of contact with the fingers 27 and 30 of the circuit closing device, the shaft 41 and its arms being restored to normal position by the spring 44 as soon as the arm 40 is free

from contact with the arm 11 of the reproducer carriage. In this figure of the drawing, 46 represents the motor whereby the record-carrying spindle of the phonograph is rotated, and the electrical connections comprise the wire 47 leading from the plate 29 to the motor, the wire leading from the motor to one pole of the battery or other current generator, and the wire 50 leading from the other pole of said generator to the circuit-closing lever, the circuit being closed in the same manner as before by the depression of the lever arm 24 into contact with the fingers 27 and 30 when the coin drops into the receiving cup 22.

I am aware that previous to my invention phonographs having forward and return feed screws for the reproducer carriage have been combined with the electro-magnetic devices for shifting the screw-engaging devices from one screw to the other when the carriage reaches the limit of its forward travel, but, so far as I am aware, I am the first to provide a mechanical or non-magnetic device for this purpose, or any device for positively locking each screw-engaging device in engagement with its screw during the travel of the carriage both forwardly and backwardly, or a device whereby the movement of the carriage which brings the screw-engaging device into engagement with the forward feed screw always effects at the same time the opening of the circuit in which the driving electro-motor is contained.

Having now described my invention, what I claim as new therein and desire to secure by Letters Patent is as follows:—

1. The combination of the reproducer carriage of a phonograph, a return screw therefor, a screw engaging device connected to the carriage, and a rigidly mounted bar for engaging said device and locking the same in engagement with the return screw.

2. The combination of the traveling reproducer carriage of a phonograph, a screw for feeding the same forwardly, a screw for effecting the return movement, screw-engaging devices connected to the carriage, and means for locking one of said devices in engagement with the forward feed during one movement of the carriage and the other in engagement with the return screw during the reverse movement.

3. The combination of the traveling reproducer carriage of a phonograph, a screw for feeding the same forwardly, a screw-engaging device connected to the carriage, a supporting bar for the carriage during the forward movement of the same, and a locking bar between which and said supporting bar a member of the carriage is confined throughout such forward movement.

4. The combination of the traveling carriage of a phonograph, with a locking bar therefor adjustable as to its length.

5. The combination of the traveling carriage of a phonograph, a feed screw therefor, a screw-engaging device connected to the carriage, and a locking bar for said screw-engaging device adjustable as to its length. 70

6. The combination of the traveling carriage of a phonograph, a screw for feeding the same forwardly, a return screw, screw-engaging devices connected to the carriage, and a locking bar, one of whose faces locks said devices during the forward movement of the carriage and the other during the return movement. 75

7. The combination of the traveling carriage of a phonograph, a bar on which the carriage is pivotally mounted, forward and return feed screws, screw-engaging devices connected to the carriage, a locking bar for holding said devices in engagement with their respective screws, and automatic means for turning said carriage about the bar on which it is mounted when the carriage reaches the end of its movement in one direction. 80

8. The combination of the traveling carriage of a phonograph, a bar on which the carriage is pivotally mounted, forward and return feed screws, screw-engaging devices connected to the carriage, a locking bar extending in the direction of movement of said carriage for holding said devices in engagement with their respective screws, and automatic and non-magnetic means for turning said carriage about the bar on which it is mounted when the carriage reaches the end of its movement in one direction. 85 90 95 100

9. The combination of the traveling carriage of a phonograph, a bar on which the carriage is pivotally mounted, forward and return feed screws, screw-engaging devices connected to the carriage, a locking bar extending in the direction of movement of said carriage for holding said devices in engagement with their respective screws, and a spring for turning the carriage about the bar on which it is mounted when the carriage reaches the end of its movement in one direction. 105 110

10. The combination of the traveling carriage of a phonograph, a bar on which the carriage is pivotally mounted, forward and return feed screws, screw-engaging devices connected to the carriage, means for holding one or the other of said devices in engagement with its corresponding screw, a spring, and means actuated by the movement of the carriage for subjecting said spring to tension, said spring acting on said carriage to turn it about the bar on which it is mounted to effect the shifting of said screw-engaging devices when the latter are released by said holding means. 115 120 125

11. The combination of the traveling carriage of a phonograph, forward and return feed screws therefor, screw-engaging devices 130

connected to said carriage, a bar for locking said devices in position during both their forward and return movements, and a spring for effecting the shifting of said devices in respect to the feed screws and to the locking bar when the carriage reaches the termination of its movement in one direction.

12. The combination of a traveling reproducer carriage of a phonograph, forward and return feed screws therefor, screw-engaging devices connected to the carriage, a bar having one face for locking one of said screw-engaging devices in position during the forward movement of the carriage and another face for locking the other screw-engaging device in position during the return movement of the carriage, said bar having a beveled end, and a yielding device for shifting the screw-engaging devices when the carriage reaches the termination of its forward movement and moving the same into position to engage the beveled end of the locking bar.

13. The combination of the traveling reproducer carriage of a phonograph, means for moving the same forwardly and backwardly, means for supporting the carriage during its movement in one direction permitting it to drop by gravity at the end of such movement, and a motor or circuit-governing lever actuated by an element of the reproducer carriage as the same drops by gravity from said supporting means.

14. The combination of the traveling reproducer carriage of a phonograph, means for moving the same forwardly and backwardly, means for supporting said carriage during its movement in one direction permitting it to drop by gravity at the end of such movement, a motor or circuit-controlling lever mounted in position to be struck by a member of the reproducer carriage as the same drops by gravity from said supporting means.

15. The combination of the traveling car-

riage of a phonograph, means for moving the same forwardly and backwardly, an electric circuit containing the driving motor for the carriage, a circuit-controlling lever, means for actuating the same to close the circuit of the motor, and a contact device for said lever having a plurality of oppositely-facing fingers with which said lever coacts, one set of said fingers being elastic, said lever being engaged by said carriage and withdrawn from said device thereby as the carriage completes a forward and return movement.

16. The combination of the traveling carriage of a phonograph, means for moving the same forwardly and backwardly, an electric circuit containing the driving motor for the carriage, a circuit - controlling lever, means for actuating the same to close the circuit of the motor, and a contact device engaged by said lever and constituting a frictional retainer therefor, said contact device having a plurality of oppositely-facing fingers between which the lever is interposed, one set of said fingers being elastic and provided with means for adjusting the pressure of the same upon the lever, said lever being engaged by said carriage and withdrawn from said device thereby as the carriage completes a forward and return movement.

17. The combination of the traveling carriage of a phonograph, forward and return feed screws therefor, screw-engaging devices connected to the carriage, a bar for holding one or the other of said devices in engagement with its respective screw, said bar being adjustable to vary its length, and a spring for effecting the shifting of said devices when the carriage reaches the termination of its movement in one direction.

This specification signed and witnessed this 7th day of August, 1907.

ISAAC W. NORCROSS.

Witnesses:

D. S. EDMONDS,

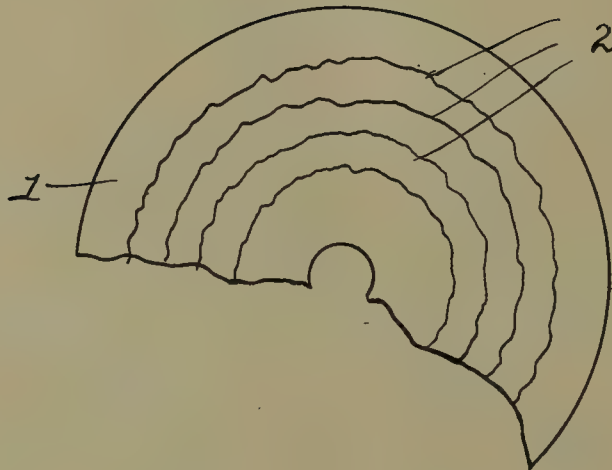
SAMUEL L. MARCUS.

I. KITSEE.
PHONOGRAPHY.

APPLICATION FILED JULY 18, 1907.

900,934.

Patented Oct. 13, 1908.



WITNESSES:

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Mary C. Smith

INVENTOR.

I. Kitsee

UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA.

PHONOGRAPHY.

No. 900,934.

Specification of Letters Patent.

Patented Oct. 13, 1908.

Application filed July 18, 1907. Serial No. 384,299.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Phonography, of which the following is a specification.

My invention relates to an improvement in phonography. Its object is to produce an original record adapted to have therefrom, with the aid of photography, produced a number of copies.

In application Serial No. 374,213, filed May 17th 1907, and in application Serial No. 380,960, filed June 26th 1907, I have described means, whereby with the aid of a liquid, colored so as to be opaque to the rays of light, or with the aid of a solid crayon, phonographic lines may be traced or drawn on a material transparent to the rays of light. I have found that in both cases an original record, useful for the purpose of producing copies therefrom, can be made.

I will describe here both processes and the product resulting therefrom.

In one case, that is, where the liquid is used, I preferably provide a reservoir containing the necessary liquid with means to cause the liquid to flow out of said reservoir in a stream fine enough, so as to produce a line of the necessary thickness, and I connect the vibrating diaphragm either directly or indirectly with the means whereby the liquid issues from the reservoir, in a manner so that the vibrations of the diaphragm will produce vibrations of said means, thereby producing the required undulatory line; but it is obvious that instead of a free-flowing liquid, a pen or ink stylus may be used. In the other case, that is, where a crayon or pencil is employed, I connect to the stylus the pencil or crayon and trace on the transparent material the undulating lines in substantially the same manner as in the method aforesaid, wherein the liquid is used, with the exception that in this last case the crayon or pencil has to be in contact with the material on which the lines are to be traced.

Different materials may be used for the

purpose of having thereon reproduced the vibrations of the phonographic diaphragm, but I have found that glass in the first case and tracing cloth in the second case answers the purpose well.

The drawing represents in plan view part of a record made in accordance with my invention.

In this drawing, 1 is the transparent material and 2 are the lines marked thereon with a material opaque to the rays of light.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. An original phonographic record consisting of a transparent material and sound waves written thereon with a non-magnetic material opaque to the rays of light.

2. An original sound record comprising a material transparent to the rays of light and undulating lines of non-magnetic material representing sound waves, said lines opaque to said rays of light.

3. An original phonographic record consisting of a plate or sheet of a material transparent to the rays of light and having recorded thereon lines with a non-magnetic material opaque to said rays of light.

4. As a new article of manufacture, a phonographic record comprising the lines of record and the sheet or plate on which said lines are made; the sheet or plate of a material transparent to the rays of light and the lines of record of a non-magnetic material opaque to the rays of light.

5. As a new article of manufacture, a record comprising a flexible transparent sheet having recorded thereon with opaque non-magnetic material phonographic characters.

6. As a new article of manufacture, a tracing cloth having recorded thereon opaque laterally undulating phonographic lines of record.

In testimony whereof I affix my signature in presence of two witnesses.

ISIDOR KITSEE.

Witnesses:

EDITH R. SHILLEY,
MARY C. SMITH.

J. S. KERR.

SOUND BOX.

APPLICATION FILED DEC. 28, 1907.

901,713.

Patented Oct. 20, 1908.

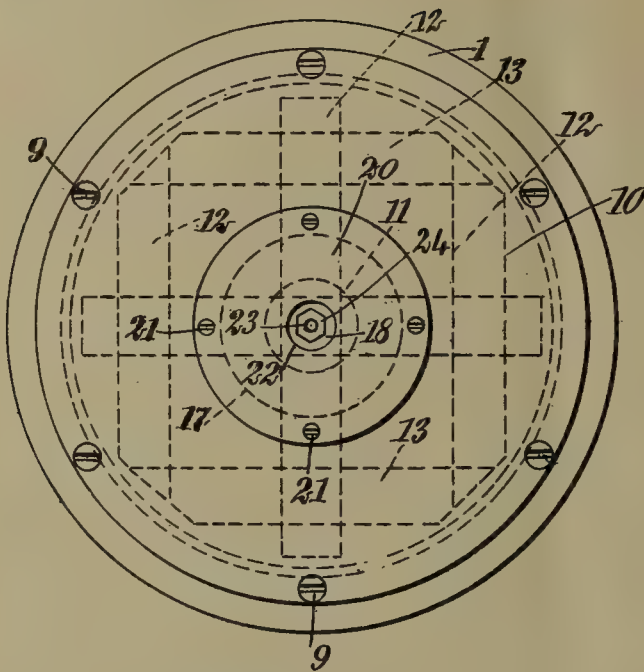


Fig. 1.

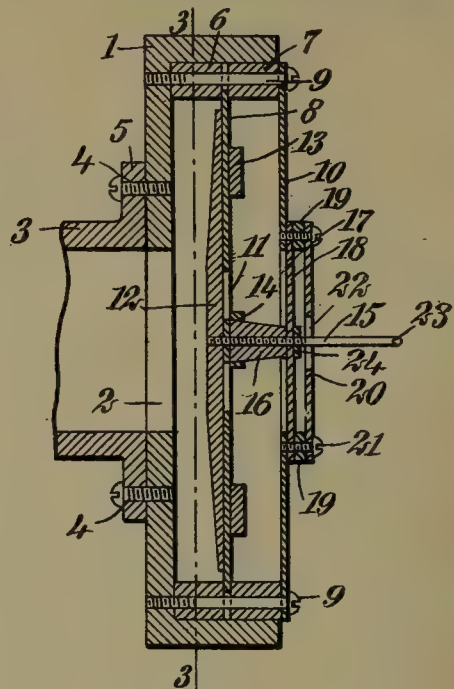


Fig. 2.

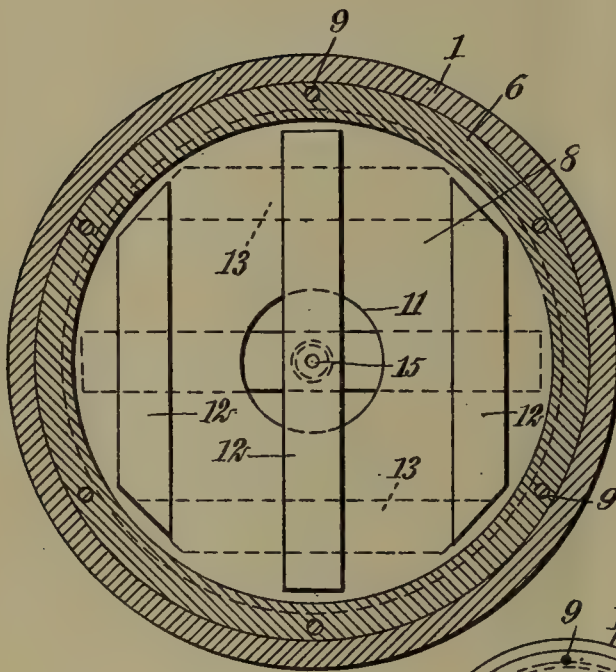


Fig. 3.

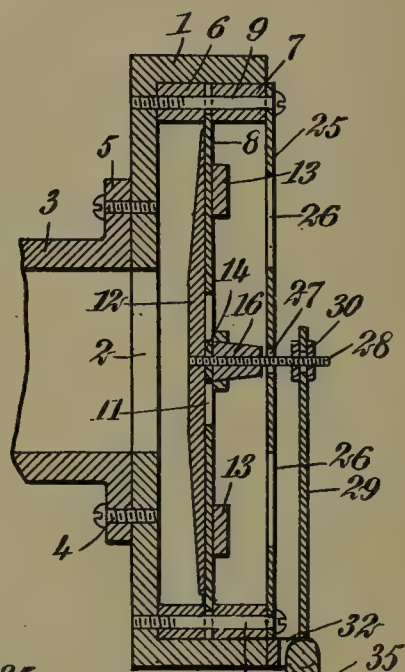


Fig. 4.

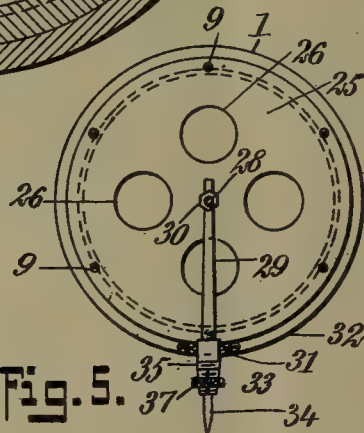


Fig. 5.

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John K. Braden

INVENTOR
James S. Kerr
BY *Mumoles*
ATTORNEYS

UNITED STATES PATENT OFFICE.

JAMES SMITH KERR, OF VALPARAISO, CHILE.

SOUND-BOX.

No. 901,713.

Specification of Letters Patent.

Patented Oct. 20, 1908.

Application filed December 28, 1907. Serial No. 408,388.

To all whom it may concern:

Be it known that I, JAMES S. KERR, a subject of the King of Great Britain, and a resident of Valparaiso, Chile, South America, have invented a new and Improved Sound-Box, of which the following is a full, clear, and exact description.

This invention relates to sound boxes, and is particularly useful in connection with talking-machines and the like.

An object of the invention is to provide a simple and efficient sound box for talking-machines and the like, in which practically the entire quantity of sound waves produced is forced to pass through the sound tube, in which inharmonious or disturbing vibrations are avoided, and in which all deadening of the sound waves is prevented.

A further object of the invention is to provide a device of the character described having a diaphragm of particularly efficient construction which is so formed that practically all secondary vibrations are obviated, and to which the stylus bar is connected in such a manner that the use of glue, cement or the like is avoided.

A still further object of the invention is to provide a sound box in which the diaphragm is inclosed in a substantially air-tight chamber, thereby avoiding the escape of the sound waves to the outer air with the consequent diminution of the sound volume produced by the machine.

The invention consists in the construction and combination of parts to be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views, and in which

Figure 1 is an inverted plan view of a sound box incorporating my improvements; Fig. 2 is a transverse section of the sound box; Fig. 3 is a section on the line 3—3 of Fig. 2; Fig. 4 is a transverse section of a modified form of the sound box; and Fig. 5 is an elevation showing the modified form of the device.

Before proceeding to a more detailed explanation of my invention it should be understood that in certain forms of sound boxes at present in use in connection with talking-machines and the like, a portion only of the sound vibrations produced by the diaphragm

is used. As a sound box of this type is open at one side the vibratory effect on the open side produces a false tone, or at any rate, a tone not in unison with that which proceeds from the mouth of the horn or other means by which the sound is conducted to the open air, and this secondary or outside tone circling around the reproducing cylinder or disk and running along the outer side of the horn can be heard disagreeably, and produces a constant discord in the whole area it pervades. In one form of my invention the diaphragm is entirely inclosed in the sound box which is formed so as to be practically air-tight, and therefore, nearly all of the vibrations set up necessarily pass through the opening or openings in the sound box into the sound tube to conduct the sound to the horn. In the construction of my sound box I employ such materials only, which do not tend to deaden the sound. Furthermore, in securing the stylus bar to the diaphragm I provide means which obviate the necessity of using glue, cement or the like, as these substances have been shown to produce sound losses of no mean size. The construction of the sound box insures the mixing of the whole sound inside the sound box thereby insuring a blending of the sound prior to its leaving the box, and consequently the issuance of a pure tone from the horn. I have found that by perforating the diaphragm and providing a substantially central opening through the same the purity of the resulting tone is enhanced without diminution of the tone volume, provided the diaphragm is suitably braced. For this purpose I provide bracing members which extend across the opposite faces of the diaphragm and which lend to it the necessary strength to insure sufficient stiffness, while at the same time obviating secondary or interfering sounds.

Referring more particularly to the drawings, I provide a sound box casing 1, which may be of any preferred or common form and consists preferably of a cylindrical box open at one side and having an opening therethrough at the back. It is mounted upon the sound tube 3 at the opening 2 by means of screws 4, which pass through suitable openings in the sound box back and the laterally extended flange 5 of the sound tube. Arranged concentrically within the sound box and adjacent to the sides of the same are separate annular members or rings 6 and 7,

formed preferably from card-board or the like. The diaphragm 8, which may be of any preferred or common form, is arranged between the rings 6 and 7 and is held in position by means of screws 9, which pass through openings in the rings, the diaphragm and the back of the sound box. The sound box cover 10, consisting preferably of a larger disk, is mounted upon the outer ring 7 and is also held in position by means of the screws 9 which pass through suitable peripheral openings in the cover.

The diaphragm 8 has a central opening 11; and at the faces is provided with transverse bracing strips or members 12 and 13. The members 12 and 13, at the opposite faces of the diaphragm extend at right angles with respect to each other. The central members extend over the opening 11 and intersect at substantially the center of the diaphragm. The bracing members may be formed from any suitable material such as a close grained wood or the like and are tapered at the extremities, being thickest at their middles, thereby insuring sufficient rigidity at the central portion of the diaphragm. A washer 14 approximating in thickness that of the diaphragm, is arranged between the intersecting central bracing members. In the form of the device shown in Figs. 1 and 2 a threaded stylus rod 15 has arranged thereupon a tapered block 16 seating against the washer 14 through an opening of one of the center bracing members. At the outer face of the diaphragm the threaded stylus rod extends beyond the tapered block and is arranged in correspondingly threaded openings of the washer 14 and the central bracing member 12 at the opposite side of the diaphragm 8. In this way the stylus rod is rigidly secured to the diaphragm at the central opening 11 of the same without the use of glue, cement or the like. The bracing members can be mounted upon the diaphragm in any suitable manner which avoids the use of glue or cement; for instance, by the use of albumen.

The stylus rod 15 extends through a central opening 17 of the cover 10 and passes through a flexible membrane 18 arranged over the opening and held in position by means of a ring 19 and a cap 20, which are mounted upon the cover 10 by means of screws 21 passing through suitable openings. The cap 20 has a central aperture 22 through which the stylus bar passes. The latter has at the end a sapphire or other point 23 which engages the record. A nut 24 is screwed upon the stylus bar and holds the flexible membrane firmly between the end of the tapered block and the nut, thus insuring that the construction is air-tight. The ring 19 may consist of any suitable gasket material.

In the form of my invention shown in Fig. 4 the sound box is not air-tight and is pro-

vided with a single cover 25 corresponding to the cover 10 and mounted upon the outer ring 7. The cover 25 has openings 26 therethrough, preferably four in number and arranged symmetrically between the center of the cover and the periphery. The cover, furthermore, has a central opening 27 through which a threaded bar 28 can project. In this form the bar 28 does not act as a stylus but has the stylus bar 29 secured thereto by means of nuts 30. The stylus bar 29 is pivoted by means of knife edges 31 at a suitable bracket 32 mounted near the end of the sound box and has a device 33 for removably securing needle points 34 thereto. With the open form of the sound box the diaphragm has no central opening 11 but is unperforated. The braces 12 and 13 are the same however, as in the perforated diaphragm, the construction otherwise being unchanged. I have found the open sound box of this form to be particularly useful for the production of loud sounds.

The flexible membrane 20 can be fashioned from any suitable material such as leather, fabric and the like, and should possess sufficient flexibility and be of such texture that air cannot readily pass therethrough.

The device 33 for removably securing the needle points 34 to the sound box, comprises a socket 35 which is split and of tapered form. The socket is exteriorly provided with threads 36, and has a nut 37 which can be screwed longitudinally of the socket to jam the point 34 securely in position. The socket is formed from resilient material such as spring metal, which tends to maintain the socket in a normal position.

Having thus described my invention I claim as new, and desire to secure by Letters Patent:—

1. In a sound box, a diaphragm having an opening therethrough, and means for connecting a stylus bar to said diaphragm at said opening intermediate and remote from the edges of the diaphragm forming said opening.

2. In a sound box, a diaphragm having an opening therethrough, and bracing members rigidly secured to one of the faces of said diaphragm and extending across the same, said members being contiguous with respect to said diaphragm throughout their lengths.

3. In a sound box, a diaphragm having an opening therethrough, and bracing members rigidly mounted upon said diaphragm and extending over said opening.

4. In a sound box, a diaphragm having an opening therethrough, bracing members rigidly mounted upon said diaphragm and extending over said opening, and means for securing a stylus bar to one of said members within said opening.

5. In a sound box, a diaphragm having an opening therethrough, bracing members

rigidly mounted upon said diaphragm and extending over said opening in different directions, a stylus bar, and means for securing said stylus bar to said members within said opening.

6. A sound box, having a diaphragm provided with elongated bracing members secured thereto at opposite faces of the same and extending across said faces and contiguous with respect thereto for the greater part of the length of each of said members.

7. A sound box, having a diaphragm provided with elongated bracing members mounted upon opposite faces of said diaphragm, said bracing members of the opposite faces being arranged at angles with each other.

8. A sound box, having a diaphragm provided with an opening therethrough, bracing members mounted at opposite faces of said diaphragm and extending over said opening, a stylus bar, and means carried by said stylus bar for securing the same to said bracing members at said opening intermediate the edges thereof.

9. A sound box, having a diaphragm provided with an opening therethrough, elongated bracing members mounted at the opposite faces of said diaphragm and extending over said opening, one of said bracing members having an opening therethrough, a block arranged in said opening of said bracing member and seated against the opposite bracing member, and a stylus bar having an extension carried by said bracing members and said block.

10. A sound box having a diaphragm arranged therewithin and provided with an opening therethrough, said diaphragm having oppositely arranged bracing members at the opposite faces thereof extending over

said opening, one of said bracing members having an opening, a block arranged in said opening of said bracing member, a washer arranged between said bracing members, said washer and said block having threaded openings, a stylus bar having a threaded extension arranged in said threaded openings, and a cover mounted upon said casing and having an opening provided with a flexible membrane, said stylus bar extension passing through said flexible membrane.

11. A sound box, comprising a sound-proof casing, a diaphragm within said casing, a sound-proof cover upon said casing and having an opening, and a stylus bar secured to said diaphragm and passing through said opening and having a flexible sound-proof connection therewith.

12. A sound box, comprising an air-tight casing, a diaphragm within said casing, an air-tight cover upon said casing having an opening therethrough, a flexible membrane mounted over said opening, a stylus bar secured to said diaphragm and passing through said membrane, and means for securing said membrane to said stylus bar.

13. A sound box, comprising an air-tight casing, a diaphragm within said casing, an air-tight cover upon said casing and having an opening therethrough, flexible air-tight means for closing said opening, a stylus bar secured to said diaphragm and passing through said closing means, and means for securing said stylus bar to said closing means.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES SMITH KERR.

Witnesses:

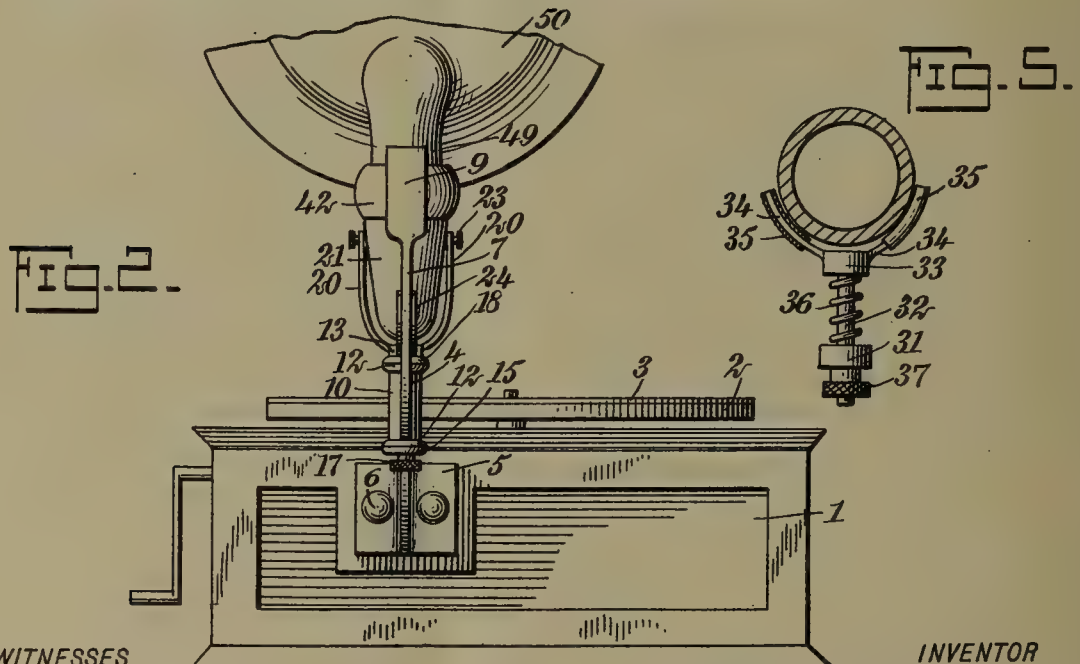
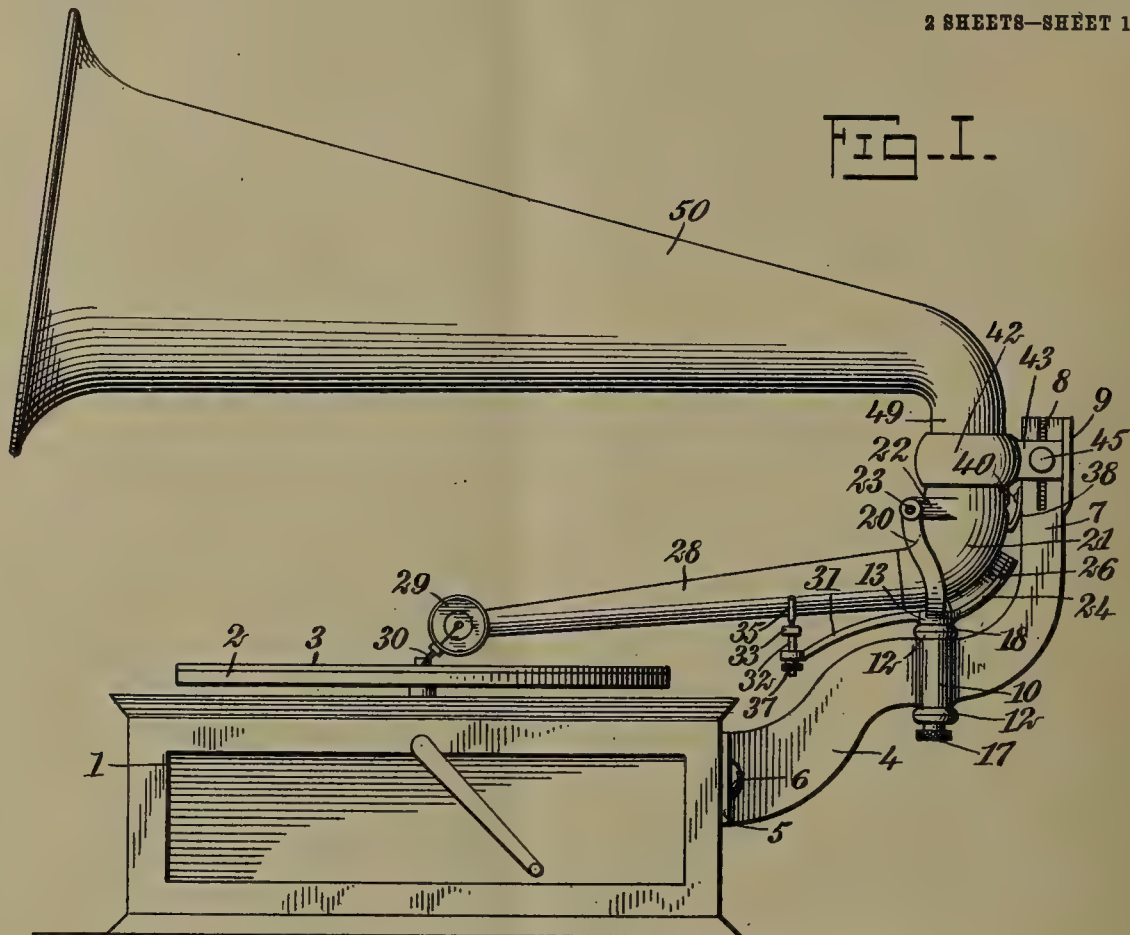
HENRY G. OXLEY,
DAVID WILLIAMS.

W. A. CHAPMAN.
TALKING MACHINE.
APPLICATION FILED OCT. 9, 1907.

901,781.

Patented Oct. 20, 1908.

2 SHEETS—SHEET 1.



WITNESSES

G. R. Thomas
John K. Brachvogel

INVENTOR

William A. Chapman

BY Munnico

ATTORNEYS

901,781.

2 SHEETS—SHEET 2.

Fig. 4.

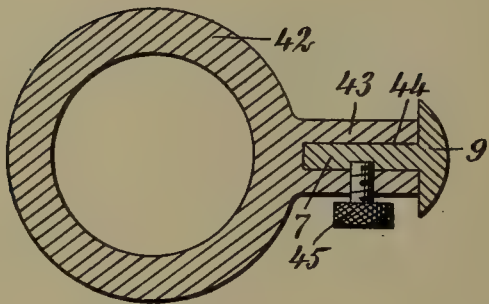


Fig. 3.

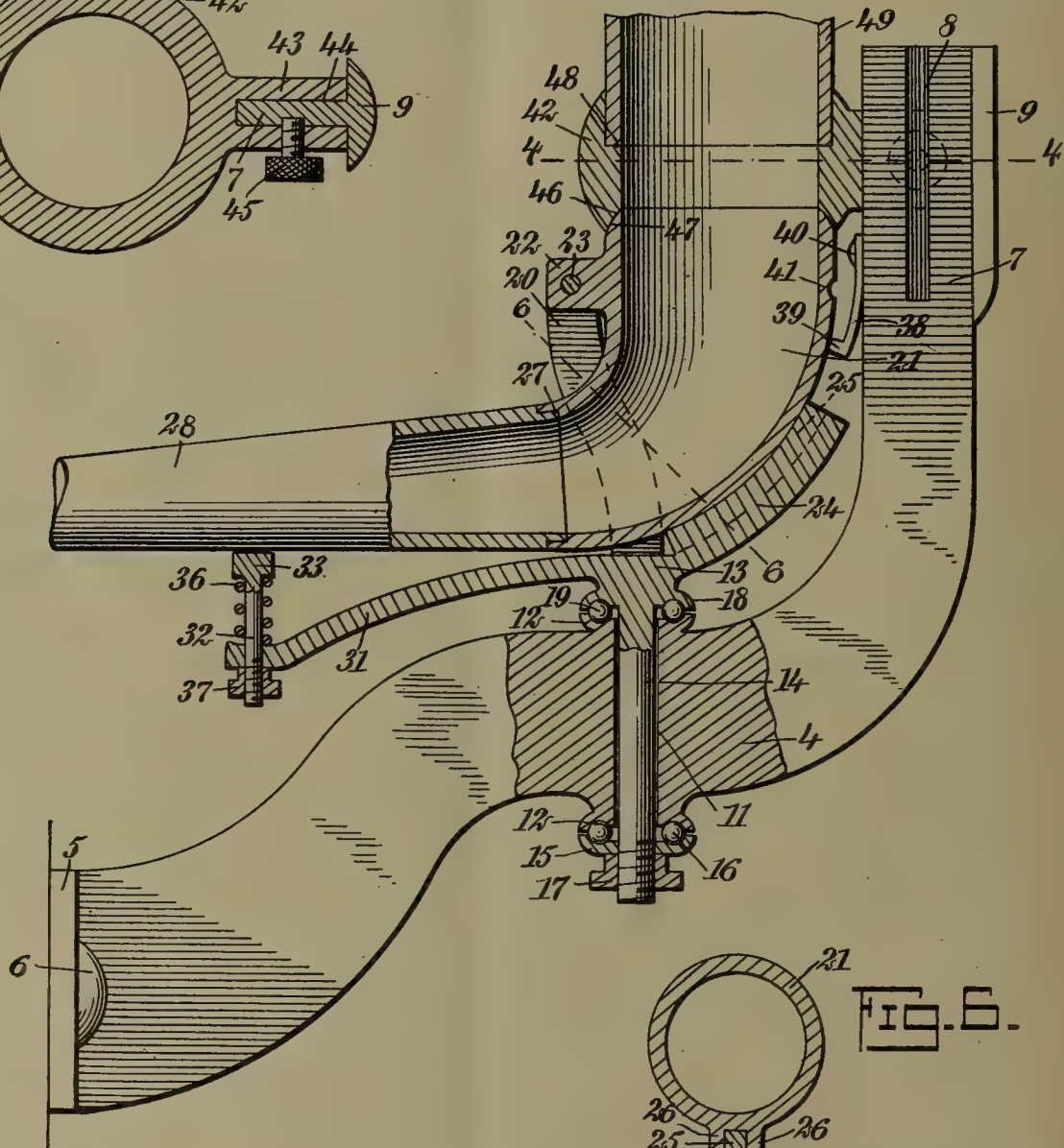
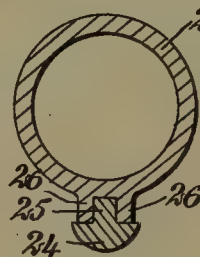


Fig. 6.



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ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM ALBERT CHAPMAN, OF SMITHVILLE, ARKANSAS.

TALKING-MACHINE.

No. 901,781.

Specification of Letters Patent.

Patented Oct. 20, 1908.

Application filed October 9, 1907. Serial No. 396,566.

To all whom it may concern:

Be it known that I, WILLIAM ALBERT CHAPMAN, a citizen of the United States, and a resident of Smithville, in the county of Lawrence and State of Arkansas, have invented a new and Improved Talking-Machine, of which the following is a full, clear, and exact description.

This invention relates to talking machines, and more particularly to the horn and sound tube attachments of talking machines employing disk records.

An object of the invention is to provide a talking machine having means for supporting the sound tube so that the latter is free to swing in two directions, without interrupting the propagation of the sound waves through the sound tube and the horn which communicates therewith.

20 A further object of the invention is to provide a device of the class described in which the sound tube is mounted free to swing in two directions; that is, in a horizontal and a vertical plane, and in which
25 the sound tube is resiliently held, when in an operative position, thereby avoiding the imposing of excessive weight upon the record through the sound box and reproducer.

30 A still further object of the invention is to provide a device of the class described, in which the sound tube is connected with the horn by means of a perfectly fitting joint which permits of the free relative movement
35 of the sound tube and the horn, without interfering with the propagation of the sound waves from one to the other, in which the sound tube is mounted to swing with a minimum of friction, and in which means are
40 provided for securely holding the sound tube in an inoperative position, away from the record.

45 The invention consists in the construction and combination of parts, to be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the
50 views, and in which

55 Figure 1 is a side elevation of a talking machine, showing my invention applied thereto; Fig. 2 is a rear elevation of the talking machine, showing a part of the horn broken away. Fig. 3 is an enlarged longitudinal section of a part of the device, show-

ing the sound tube and horn connection; Fig. 4 is a transverse section on the line 4—4 of Fig. 3; Fig. 5 is a transverse section through the sound tube near the end remote
60 from the record; and Fig. 6 is a transverse section on the line 6—6 of Fig. 3.

Before proceeding to a more detailed explanation of my invention, it should be understood that the same is particularly
65 useful with talking machines employing disk records, notwithstanding that it can also be used with different types of devices of this character.

Many of the details of construction can
70 be altered without disturbing the underlying principle of the invention, which consists essentially in the manner of supporting the sound tube and the horn, the connection
75 through which these communicate, and the manner of mounting the whole upon the talking machine body. In talking machines, the sound being reproduced is transmitted from the record through the sound
80 box to the sound tube, the sound vibrations progressing through the sound tube to the horn which conducts them to the outer air and the ears of the hearers. It is essential that the sound tube be freely movable, in
85 order to permit the reproducer to follow the indications upon the records when the machine is in operation. Furthermore, it must be possible to displace the entire tube to permit the records to be changed. In consequence,
90 it is necessary to mount the sound tube in such a manner that it can move freely in at least two directions, without interrupting the internal communication between the sound tube and the horn. A flexible connection can of course be established
95 between these two parts by means, for instance, of rubber tubing or the like, but it has been found that material of this nature serves to deaden the sound and is unserviceable for other reasons. Consequently, the
100 connection between the sound tube and the horn should consist of a rigid walled member capable of conducting the sound waves freely. I provide a connection which is so
105 jointed that the internal connection between the sound tube and the horn is at all times substantially uninterrupted, while it in no way interferes with sound propagation therethrough. Furthermore, the connection
110 is substantially air-tight and thereby the admission of sound waves or air currents from the outside is obviated. Unless the sound

tube is suitably supported, too much weight is carried by the needle or stylus of the reproducer when the latter rests upon the record. For this reason I provide a resilient support for the sound tube, which takes the greater part of the weight from the reproducing parts and thereby prevents unnecessary wear both of the latter and of the record.

Referring more particularly to the drawings, 1 represents the body of a talking machine of the disk record type, which has a revolving table 2 for carrying the record 3. The talking machine has suitable operating mechanism (not shown) for rotating the record in the usual manner. A standard 4, formed from suitable material such as cast iron, brass or the like, is mounted at the side of the talking machine body by means of laterally disposed flanges 5 and screws or bolts 6. At the outer end, the standard has an upward, substantially vertically disposed post 7, provided with a groove 8 at one side and, at the rear, with a back 9, for a purpose which will appear hereinafter. The back is preferably formed integral with the standard. The standard intermediate of the extremities has a laterally extended part 10, through which is formed a bore or opening 11, the longitudinal direction of which is substantially vertical and parallel to the post 7. Surrounding the opening 11, at the upper and lower ends of the same, the standard has integral annular cups or ball races 12, for a purpose which will appear hereinafter.

A cradle 13, formed from suitable material such as cast-iron, brass or the like, is mounted to swing upon the standard by means of an integral shaft or spindle 14 revolubly arranged in the opening 11. The lower end of the spindle is threaded. An annular ball race 15 is arranged upon the spindle and rests against a set of ball bearings 16 located between the race 15 and the race 12. A thumb-nut 17 mounted upon the threaded end of the spindle, serves to hold the latter in position within the opening, at the same time suitably supporting the lower ball bearing. A ball race 18, is formed integral with the cradle at the end of the spindle adjacent to the same, and co-acts with the race 12 to form a ball bearing between the cradle and the standard, a set of balls 19 being provided for the purpose between the races. In this way the cradle is revolubly or pivotally arranged upon the standard and is free to swing in a horizontal plane with a minimum of friction. The cradle has forks 20 at the opposite sides. Between the forks 20 is arranged a hollow elbow 21, which is mounted to swing between the forks by means of an integral rib 22, extending laterally from the elbow and pivotally mounted by means of a pin 23, between the upper ends of the forks.

At one side, the cradle 13 has a curved extension 24, projecting toward the post 7 and provided with a tongue 25. The extension, as well as the tongue is curved in the arc of a circle having a radius equal to the distance between the extension and the pivotal point of the elbow. The adjacent wall of the elbow is similarly curved and has flanges 26, which form a groove slidably engaging the tongue 25. The tongue and the groove hold the elbow securely against lateral displacement, while permitting it to swing freely about its pivotal point.

At the lower edge, the elbow is fashioned interiorly to form a shoulder 27. The sound tube 28, has the end remote from the sound box constricted to fit into the lower end of the elbow and to form a tight connection therewith, as is shown most clearly in Fig. 3. The sound tube 28 has the usual sound box 29, with a needle or stylus 30, adapted to engage the record 3 and reproduce the sounds which have been recorded upon the same. Opposite to the extension 24 the cradle has an arm 31, at the end of which is slidably arranged a rod 32, mounted in a suitable opening of the arm. At the upper end the rod 32 has a head 33, provided with branching forks 34. The forks 34 are preferably covered with a cushion material such as sleeves 35, of rubber, and which serve to support the sound tube. A helical spring 36, is arranged upon the pin 32 between the arm 31 and the head 33, and resiliently holds the same in a normal position, thereby resiliently supporting the sound tube. The lower end of the pin 32 is threaded and carries a thumb nut 37, by means of which it is mounted in position. A spring catch 38, having a finger 39 at the outer end, is rigidly mounted by means of a screw or rivet 40, upon the post 7. The elbow has a recess 41, adapted to co-act with the finger 39 to hold the elbow and the sound tube in an inoperative position. When the sound tube is swung upwardly the elbow is pivoted between the forks 20, and the recess 41 comes into engagement with the finger 39 of the spring catch, and the latter then holds the parts in an inoperative position. When it is desired to lower the sound tube, it can be forced downward until the tension of the spring catch is overcome and the finger slips out of engagement with the recess. It will be understood that the latter is suitably rounded to permit this operation.

An annular connection 42, is adjustably mounted upon the post 7 by means of a lateral extension 43, provided with a longitudinal recess 44, which is slidably engaged by the post. A set screw 45 engages with the recess 8 of the post to hold the connection in position. The rear of the extension 43 seats against the back 9 of the post and assists in holding the connection in position. At the

lower edge the connection 42 is formed into a rounded socket by a curved bevel 46 which conforms with the correspondingly formed upper edge 47 of the elbow 21. The elbow and the connection form a pivotal joint which permits the free movement of the elbow relative to the connection. Thus, when the sound tube and the elbow are swung in a horizontal plane, as the reproducer follows the indications on the record, the contact between the elbow and the connection is not interrupted, the curved edge of the elbow sliding freely within the interiorly beveled lower edge of the connection. At the upper edge, the connection is reamed out to form a seat 48 for the end 49 of the phonograph horn 50. The latter is firmly though removably mounted at the connection by means of the recessed seat.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In a device of the class described, in combination, a standard, a cradle arranged to swing upon said standard, a sound tube movably mounted upon said cradle and means carried by said cradle for supporting said sound tube, said cradle having a guideway, said sound tube having a part engaging slidably at said guideway.

2. In a device of the class described, in combination, a standard, a cradle arranged to swing upon said standard, a sound tube arranged to swing upon said cradle in a direction at an angle with the direction of swing of said cradle, and resilient means carried by said cradle for supporting said sound tube, said cradle having a guideway, said sound tube having a part engaging slidably at said guideway.

3. In a device of the class described, in combination, a standard, a cradle arranged to swing upon said standard, a sound tube arranged to swing upon said cradle, an adjustable connection mounted upon said standard and adapted to carry a horn, said connection communicating with said sound tube, and resilient means carried by said cradle for supporting said sound tube.

4. In a device of the class described, in combination, a standard, a cradle pivotally mounted upon said standard, an elbow mounted to swing upon said cradle, a connection movably engaging said elbow and communicating interiorly therewith, said connection being adapted to support a horn, a sound tube secured to said elbow, and resilient means carried by said cradle for supporting said sound tube, said cradle having a guide tongue, said elbow having a guide groove engaging slidably at said tongue.

5. In a device of the class described, in combination, a standard, a cradle pivotally mounted upon said standard, said cradle

being formed to constitute a guideway, an elbow mounted to swing upon said cradle and slidably engaging said guideway, a connection adjustably carried by said standard and movably engaging said elbow and communicating interiorly therewith, a horn carried by said connection, a sound tube secured to said elbow and communicating interiorly therewith, and resilient means carried by said cradle for supporting said sound tube.

6. In a device of the class described, in combination, a standard, a cradle pivotally mounted upon said standard and having a guideway, an elbow mounted to swing upon said cradle and movably engaging said guideway, a connection movably engaging said elbow and communicating interiorly therewith, a horn carried by said connection, a sound tube secured to said elbow, resilient means carried by said cradle for supporting the said sound tube, and a catch for holding said elbow in one position.

7. In a device of the class described, in combination, a standard having a post, a connection adjustably mounted upon said post and adapted to support a horn, a cradle arranged to swing upon said standard, an elbow arranged to swing upon said cradle in a direction at an angle to the direction of swing of said cradle, said elbow and said connection communicating interiorly, a sound tube secured to said elbow and communicating interiorly therewith, and resilient means carried by said cradle for supporting said sound tube, said cradle having a curved guide tongue, said elbow having a correspondingly curved guide groove slidably engaging said tongue.

8. In a device of the class described, in combination, a horn, a sound tube, a standard having a post presenting a lateral groove and flanges constituting a back, a connection slidably arranged upon said post, and means for engaging said groove and serving to hold said connection in a plurality of positions, said connection being adapted to communicate with said sound tube and to support said horn.

9. In a device of the class described, in combination, a standard having a post presenting a lateral groove and a back, an annular connection having a recess slidably arranged upon said post, means for engaging said groove and serving to hold said connection in a plurality of positions, said connection abutting against said back, a sound tube, and means for effecting an interior communication between said connection and a sound tube, said connection being adapted to support a horn.

10. In a device of the class described, in combination, a standard, a cradle swiveled upon said standard and having a guideway and forks, an elbow pivoted between said

forks and movably engaging said guideway, said guideway being curved in the arc of a circle having its center at the pivotal axis of said elbow, a sound tube communicating with said elbow, resilient means carried by said cradle for supporting said sound tube, and a connection movably engaging said elbow and adapted to carry a horn.

11. In a device of the class described, in combination, a standard having a post, an annular connection adjustably mounted upon said post and presenting a horn seat, a horn mounted at said horn seat, a cradle swiveled upon said standard and having a guideway and forks, an elbow pivotally mounted between said forks and movably engaging said guideway, a catch carried by said post and serving to hold said elbow in one position, said elbow and said connection being adapted movably to engage, a sound tube secured to said elbow, and resilient means carried by said cradle for supporting said sound tube.

12. In a device of the class described, in

combination, a standard having an opening therethrough and adjacent to the ends of said opening, roller bearing races, a cradle having a spindle revolubly arranged in said opening and provided with a roller bearing race at the end of said spindle adjacent to said cradle, a roller bearing race arranged upon said spindle near the end remote from said cradle, an adjustable member to hold the said last-mentioned race in position, said adjustable member engaging said last-mentioned race, an elbow pivotally mounted upon said cradle, a sound tube secured to said elbow, resilient means carried by said cradle for supporting said sound tube, and a connection movably engaging said elbow and adapted to carry a horn.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM ALBERT CHAPMAN.

Witnesses:

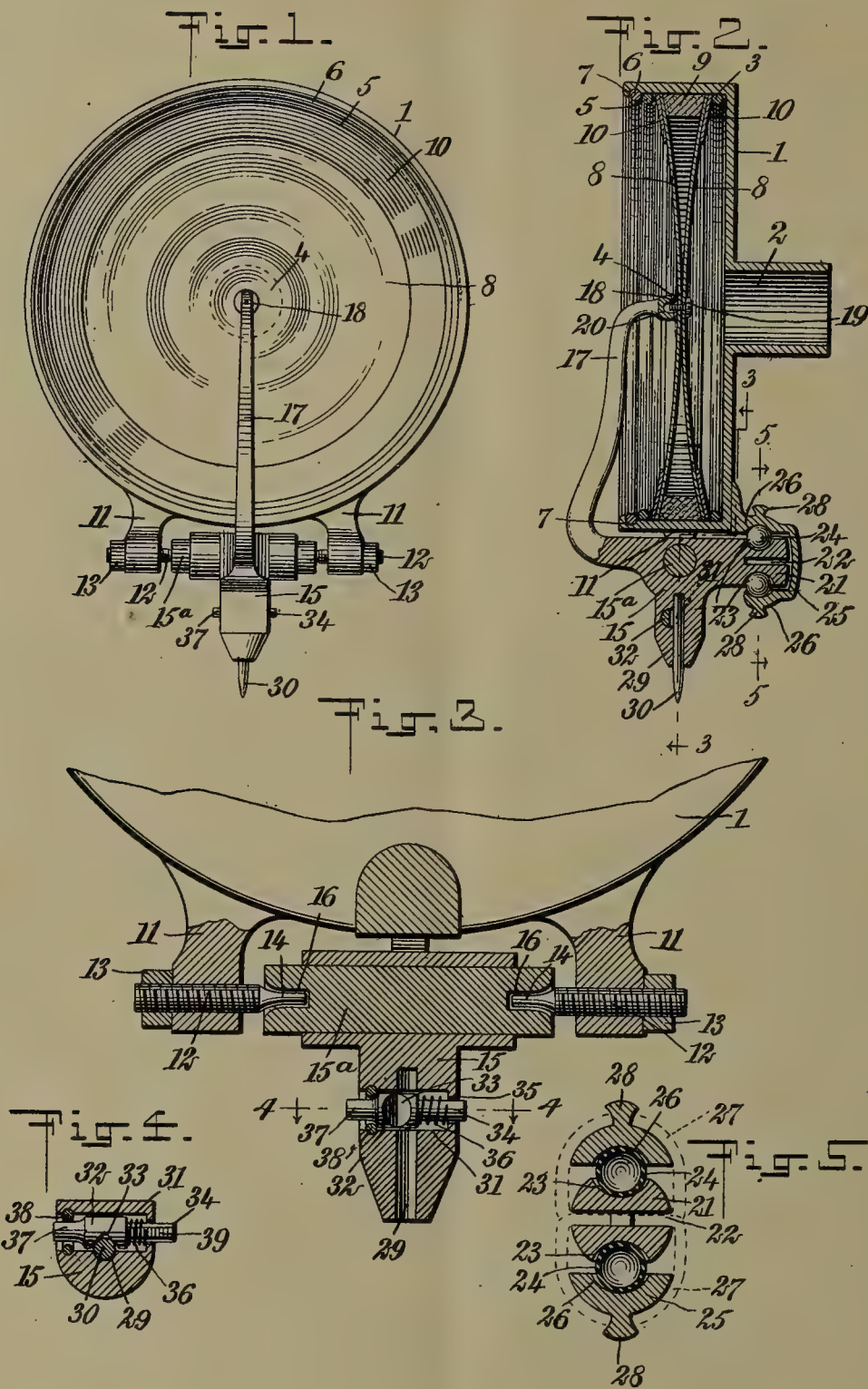
T. L. NORRIS,
S. A. D. JONES.

W. A. CHAPMAN.
SOUND REPRODUCER.

APPLICATION FILED DEC. 2, 1907.

901,782.

Patented Oct. 20, 1908.



WITNESSES

John K. Brachvogel

INVENTOR

William A. Chapman

BY *Munn Co*

ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM ALBERT CHAPMAN, OF SMITHVILLE, ARKANSAS.

SOUND-REPRODUCER.

No. 901,782.

Specification of Letters Patent.

Patented Oct. 20, 1908.

Application filed December 2, 1907. Serial No. 404,664.

To all whom it may concern:

Be it known that I, WILLIAM ALBERT CHAPMAN, a citizen of the United States, and a resident of Smithville, in the county of Lawrence and State of Arkansas, have invented a new and Improved Sound-Reproducer, of which the following is a full, clear, and exact description.

This invention relates to sound reproducers, and is particularly useful in connection with talking machines, and more especially those employing records of the disk type.

An object of the invention is to provide a simple, durable and efficient sound reproducer which is constructed to eliminate harsh, shrill and metallic tones in sound reproduction, and which exactly reproduces the volume, register and tone shading of the original sound.

A further object of the invention is to provide a sound reproducer having a diaphragm which is normally under different balanced tensions, thereby augmenting the sensitiveness and rapidity of action of the diaphragm.

A still further object of the invention is to provide a sound reproducer having a stylus bar which permits the easy and rapid insertion and removal of needle points, and which is resiliently controlled, whereby it is rendered flexible and efficient in action.

The invention consists in the construction and combination of parts to be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views, and in which

Figure 1 is a front elevation of the sound reproducer; Fig. 2 is a longitudinal section of the device; Fig. 3 is an enlarged transverse section on the line 3—3 of Fig. 2; Fig. 4 is a transverse section on the line 4—4 of Fig. 3; and Fig. 5 is an enlarged transverse section on the line 5—5 of Fig. 2.

Before proceeding to a more detailed explanation of my invention, it should be understood that in the sound reproducers hitherto employed it was generally attempted by the constructors to provide a reproducing diaphragm which was normally under no stress of any kind; that is, to attain "neutrality" in the diaphragm. It was believed that a diaphragm of this character

was particularly sensitive in responding to external forces applied thereto; for instance, the vibrations transmitted to the diaphragm through the stylus arm. I have found that the inertia of the neutral diaphragm, instead of permitting the instantaneous response of the diaphragm to extraneous force applied thereto, prevents the rapidity of action, which is not only desirable in sound reproducer diaphragms but is absolutely essential to their successful operation. Thus, the inertia of the diaphragm conduces to the suppression of delicate tones or sound shadings which are of such importance in the accurate and tuneful reproduction of sound. Certain of the vibratory impulses transmitted to the diaphragm and which the latter should reproduce, are so slight and of such intense rapidity that the neutral diaphragm is quite incapable of propagating them further. I provide a diaphragm which is normally under opposite and conflicting tensions, so that in a normal condition these stresses are balanced. This diaphragm is rendered particularly sensitive owing to the balanced tensions to which it is subject, and is responsive to the slightest and most rapid of vibratory influences. The diaphragm is under greatest tension at the center, and the tension decreases from the center toward the periphery. As the tension stresses to which the diaphragm is subject are in opposite directions and balance each other, an impulse from either side of the diaphragm disturbs the balance, and thereby causes the tension at one side to overcome that at the other. The consequence is the instantaneous and positive action of the diaphragm to reproduce the sound. The vibrations causing the unbalancing of the tension stresses in the diaphragm are transmitted from the record to the diaphragm by means of the stylus bar.

The stylus bar of my sound reproducer is mounted to rock upon the reproducer casing. It is free to move in order to transmit the vibrations from the sound record to the diaphragm, but is provided with resilient or cushion restraining means which serve to limit the movement of the stylus bar. The needle points which are used in disk record talking machines to transmit the vibrations from the record to the stylus bar, have to be replaced at frequent intervals. To permit the needle points to be attached to or removed from the stylus bar of my invention,

easily and rapidly, I provide special needle point retaining means which can be easily and rapidly operated manually.

Referring more particularly to the drawings, 1 represents the casing of the sound reproducer, which may be fashioned from any suitable material and is preferably of circular or cylindrical form. It will be understood however, that certain of the details of construction of the device, including the form of the reproducer casing, constitute no part of my invention and can be altered to suit individual preference or different conditions. The casing 1 has an outlet 2, by means of which it can be suitably connected to the sound tube of the talking machine. The casing has a back and side walls, being open at the front. A washer 3, of annular form in cross-section, is arranged within the casing adjacent to the back thereof. The diaphragm 4 seats upon the washer 3, and at the outside of the diaphragm is arranged a second washer 5, similar to the washer 3. A split or spring ring 6, is arranged in an annular recess 7 of the casing, and serves to hold the washers and the diaphragm in position within the casing.

The diaphragm comprises similar opposite faces or disks 8, which may be formed from any suitable material for the purpose, such as mica, or the like. The disks 8 are spaced near the peripheries by means of an annular block 9, and at the outer sides have strengthening rings 10, secured upon the faces thereof near the peripheries, in any convenient manner. The disks 8 are secured together near the center in a manner which will appear more clearly hereinafter, and are thus placed under tension. The in-curving of the disks is in opposite directions, and consequently, they are under opposite tensions which normally balance each other. It will be understood that the annular separator 9 has the opposite faces beveled to permit the in-curving of the disks. The parts of the diaphragm are securely fastened together so that they constitute a rigid whole.

At the bottom of the casing are lugs 11, preferably integral therewith and provided with registering threaded openings there-through. Correspondingly threaded rocker pins 12, are arranged in the openings of the lugs and have nuts 13, by means of which they can be locked in position, and further have the inwardly projecting extremities 14, tapered for a purpose which will appear hereinafter. The stylus bar 15, is laterally extended and has an opening through the laterally extended portion, in which is rigidly mounted a rocker bar 15^a. At the ends of the latter are formed tapered recesses 16, adapted to receive the tapered extremities of the rocker pins 12. By means of the rocker pins the pivotal mounting of the stylus bar can be exactly adjusted. A vibrating arm

17, is rigidly carried by the stylus bar and is preferably integral therewith. The vibrating arm may have any suitable form and has the end inwardly disposed adjacent, substantially, to the center of the diaphragm. At the end of the vibrating arm 17 is secured a face plate 18, adapted to rest adjacent to the diaphragm, and having a threaded opening therethrough formed to receive a correspondingly threaded screw 19, which serves to secure the diaphragm to the vibrating arm and to fasten the opposite disks or plates of the diaphragm to each other. Behind the face plate 18 the vibrating arm has a recess 20, to permit the projection beyond the face plate, of the screw 19. The head of the screw is substantially equal in diameter to the width of the face plate, so that the opposite disks of the diaphragm are held together by contacting surfaces of substantially equal area.

At the side of the stylus bar 15 remote from the vibrating arm 17, is formed an arm 21, extending beyond the sound reproducer casing and having the end provided with a split or slot 22. At the top and bottom of the arm 21 are formed recesses 23, adapted to receive resilient cushions 24. The latter may be of any preferred or common form; for instance, as shown in the drawings, they may consist of hollow balls of resilient material, such as rubber. A U-shaped bracket 25, is mounted upon the casing and extends over the end of the arm 21, having recesses 26, normally arranged opposite to the corresponding recesses 23 and also serving to receive the cushions 24. It will be understood that by means of the arm 21, the cushions 24 and the bracket 25, the stylus bar is resiliently held in position such that its normal position corresponds to the normal position of the diaphragm. When the diaphragm is displaced in one direction or the other, the stylus bar is correspondingly displaced and the cushion restraining means of the stylus bar assist the diaphragm in returning to its normal position. In case it is desired to resist the movement of the stylus bar more strongly, bands 27 of rubber or the like, can be arranged in the slot 22 of the arm and passed over the bracket 25, being held in position by suitable spurs 28 of the latter, as is shown most clearly in Fig. 5.

The stylus bar 15 has a longitudinal opening or recess 29, adapted to receive the needle point 30, which may be of any preferred or common form. A transverse opening 31, is formed within the stylus bar and intersects the opening 29. A member 32 having a notch or recess 33, is movably arranged within the opening 31, and by the engagement of the notch 31 with the needle point, serves to hold the latter firmly in position. At one end, the member 32 has a constricted shank 34, projecting through a

constricted opening 35 in the stylus bar. A helical spring 36, arranged upon the shank 34 holds the member 32 in a normal, inoperative position. The member 32 which constitutes the needle point clamp, has further a constricted end 37 projecting from the opening 31. A spring ring 38 is arranged in an annular recess of the opening 31 and serves to retain the member or clamp within the opening. The shank 34 has a portion 39 of angular section, which is received by a correspondingly formed portion of the opening 35, and which prevents a rotation of the member. When it is desired to insert a needle point in position, the member 32 is moved against the tension of the spring until the notch 33 is so positioned that the needle point can be passed through it. By releasing the member, the tension of the spring jams the member against the needle point and holds the same in position in the recess 29.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a sound reproducer, a diaphragm having opposite, vibrating faces rigid with each other at a point within their peripheries, and an annular spacing member separating said faces at their peripheries whereby said faces are rendered concave, said member having the opposite sides shaped to conform to the curvature of said vibrating faces.

2. In a sound reproducer, a diaphragm having opposite, vibrating faces rigidly secured together at a point within their peripheries and in direct engagement at this point, and an annular spacing member between said faces at the peripheries thereof whereby said faces are oppositely in-curved, said member having the opposite sides shaped to conform to the curvature of said vibrating faces.

3. In a sound reproducer, a diaphragm having opposite, vibrating faces fastened together near the centers and in direct engagement at the point of fastening, and an annular spacing member separating said faces at their peripheries whereby said faces are rendered oppositely concave, said member having opposite sides beveled to conform to the concavity of said faces.

4. In a sound reproducer, a diaphragm having opposite, vibrating faces partly in engagement within the peripheries and partly spaced whereby an air-tight chamber is formed therebetween, and an annular mem-

ber between said faces and at their peripheries, said member having the opposite sides shaped to conform to the curvature of said faces.

5. In a sound reproducer, a diaphragm, a stylus bar mounted to rock and having a vibrating arm secured to said diaphragm, means for adjusting said bar, and pneumatic cushioning means for resisting the movement of said bar.

6. In a sound reproducer, a diaphragm, a stylus bar mounted to rock and having a vibrating arm, said stylus bar having a second arm, a bracket adapted to embrace said second arm near the end thereof, and cushioning means between said second arm and said bracket.

7. In a sound reproducer, a diaphragm, a stylus bar adjustably mounted to rock and having a vibrating arm secured to said diaphragm, said stylus bar having a second arm, a bracket embracing said second arm near the end thereof, said bracket and said arm having recesses, and cushioning means seated in said recesses of said second arm and said bracket, said second arm being formed to hold resilient means adapted to be removably secured to said bracket.

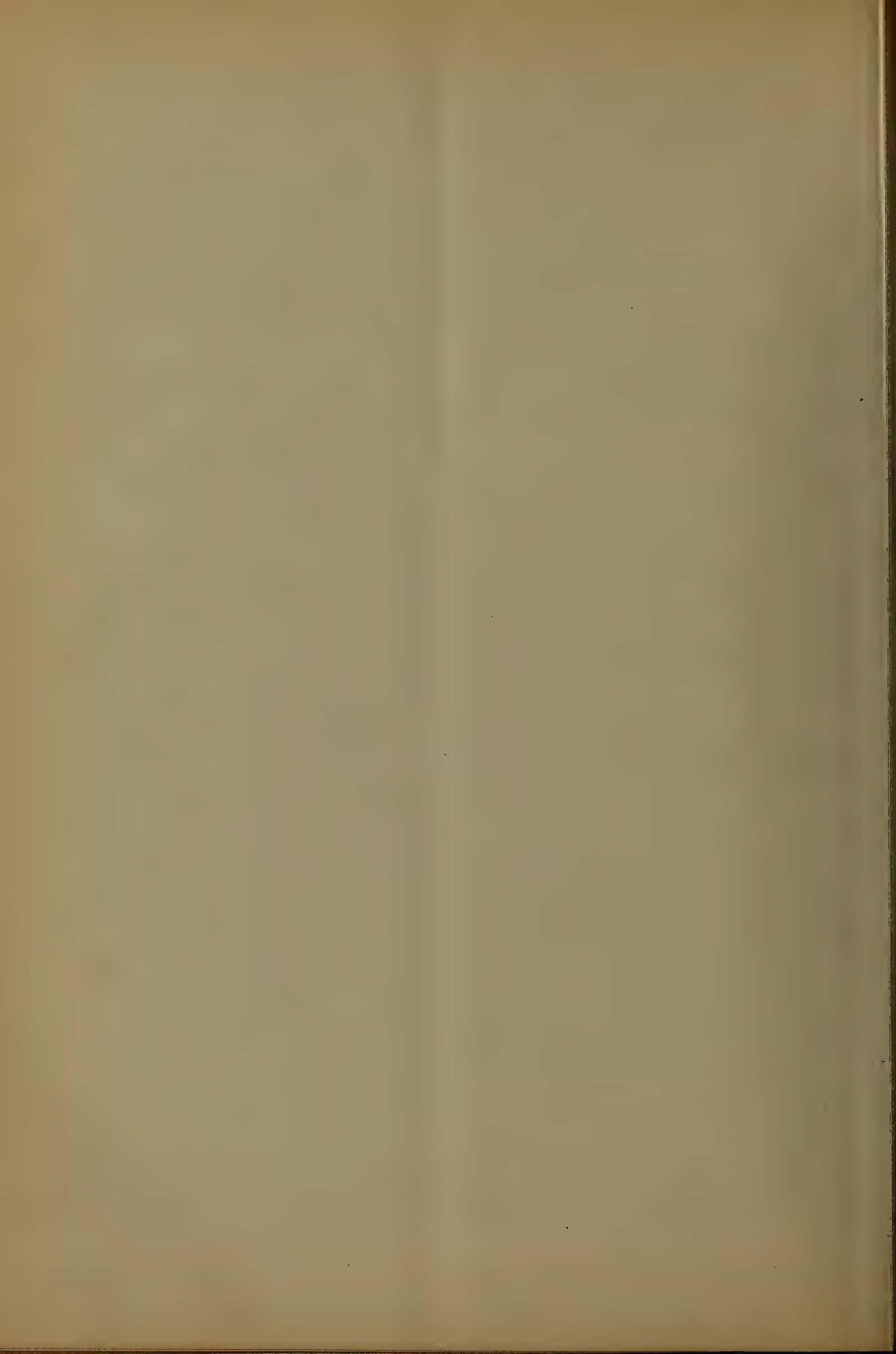
8. In a sound reproducer, a stylus bar having a recess adapted to receive a needle point, and a second recess transverse of said first recess, a member carried in said second recess and movable transversely of said first recess, said member having portions projecting from said stylus bar at the ends of said second recess and being provided with a notch adapted to grip the needle point, the projecting portions of said member being constricted whereby shoulders are formed, said second recess having a shoulder, resilient means in said second recess between said shoulder thereof and one of said shoulders of said member, and serving to hold said member in a position such that said notch is normally displaced with respect to said recess, and means engaging the other of said shoulders of said member to limit the projection of said member from said second recess.

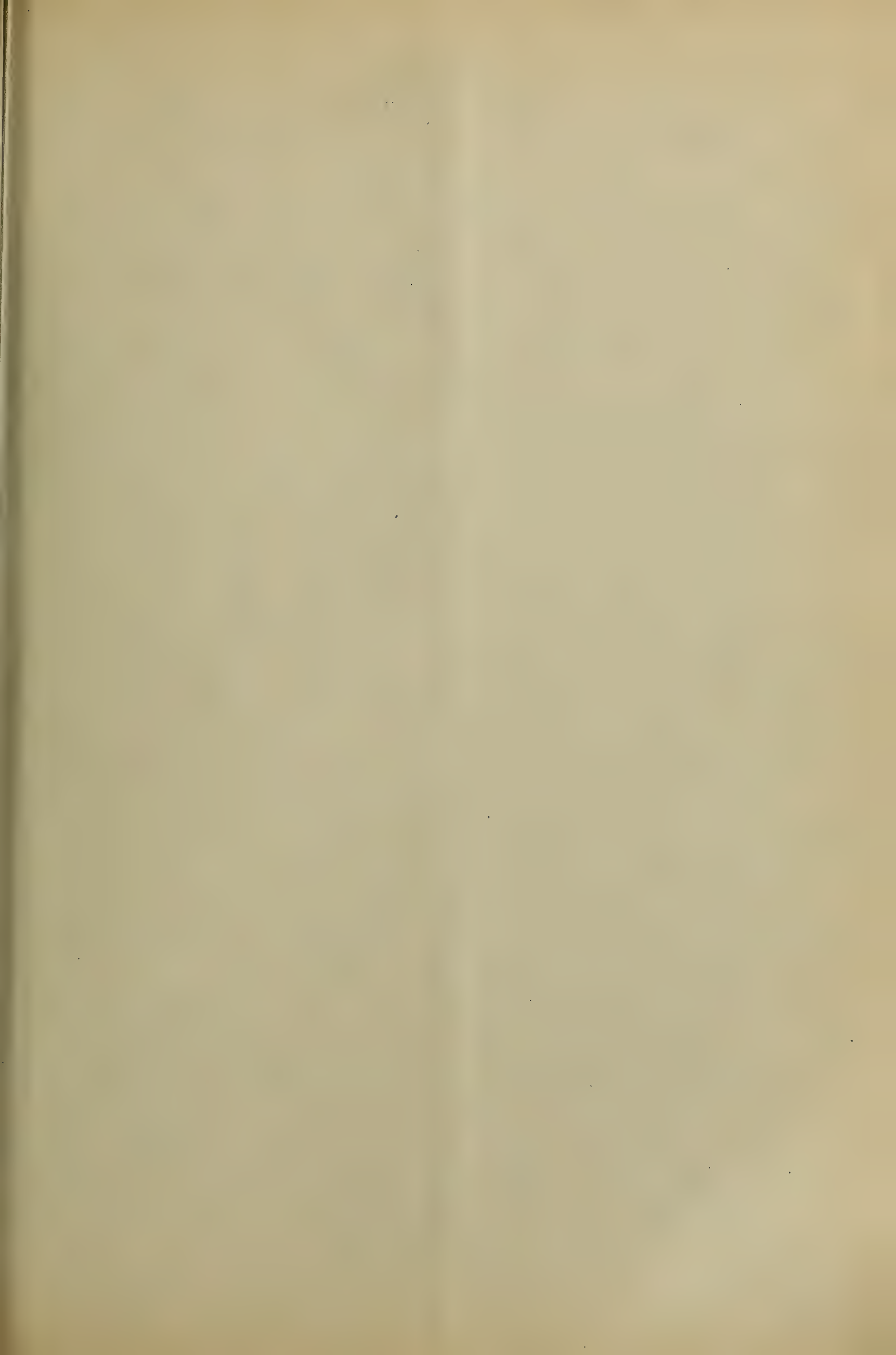
In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM ALBERT CHAPMAN.

Witnesses:

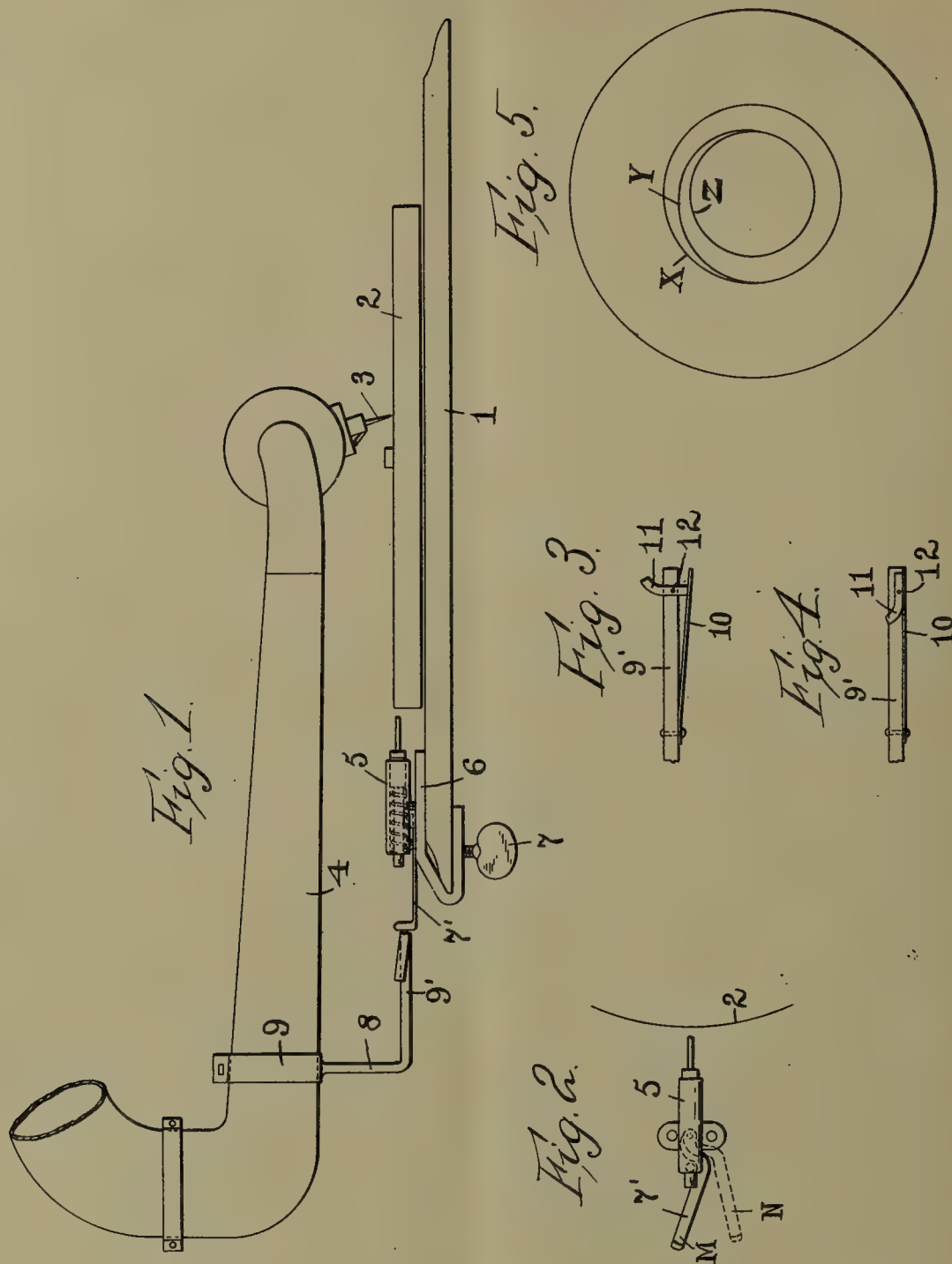
H. C. STEADMAN,
G. W. PERKINS.





901,910.

Patented Oct. 20, 1908.



Attest:

Edward L. Tolson
 Edward M. Sarton

Inventor:

Junius Wallace Jones
 By Spear Middleton Donaldton Spear
 Atty's.

UNITED STATES PATENT OFFICE

JUNIUS WALLACE JONES, OF BATON ROUGE, LOUISIANA.

GRAPHOPHONE-STOP.

No. 901,910.

Specification of Letters Patent.

Patented Oct. 20, 1908.

Application filed April 8, 1908. Serial No. 425,890.

To all whom it may concern:

Be it known that I, JUNIUS WALLACE JONES, a citizen of the United States, residing at Baton Rouge, Louisiana, have invented certain new and useful Improvements in Graphophone-Stops, of which the following is a specification.

My invention relates to automatic stops for phonographs and in providing this mechanism I aim to produce an automatic stop susceptible of adjustment for use with record plates of different diameters.

My invention is designed to coact with a form of trip stop device now in use on what is known as the Victor machine.

It is my object to produce an automatic stop which will require the addition of the fewest number of parts and which will be simple in construction and effective in operation.

The invention consists in the features and combination and arrangement of parts hereinafter described and particularly pointed out in the claims.

In the drawings, Figure 1 is a side view of a turn table of ordinary construction to receive the record disk, said turn table having associated therewith the horn, the trip stop of substantially ordinary form and my improvements. Fig. 2 is a detail plan view of the ordinary trip stop in its relation to the turn table. Fig. 3 is a plan view of a part of my invention with the elements in one position, and Fig. 4 is a similar view to Fig. 3 with the parts in another position. Fig. 5 is a plan view of a record of disk form showing the grooves which are made on all records.

In these drawings, 1 indicates a part of the casing or frame, 2 the turn table, 3 the needle point or stylus which is carried at the end of the arm 4 which supports the ordinary horn. At 5 I show generally a trip stop device somewhat like that used to-day, carried by a bracket 6 which is clamped to the edge of the table by a set screw 7. This trip device has a lever or arm 7' projecting therefrom, which in ordinary practice may be manipulated by hand to trip the stop so that it will contact with the periphery of the turntable and thus stop the rotation of the same. With my improvement however, I design to operate this substantially ordinary form of trip stop lever automatically and for this purpose I employ an arm 8 attached by a clip 9 to the arm 4 of the horn, said arm 8 being of right angular form with its horizontal portion 9'

extending inwardly so that it will describe a path as the horn swings laterally of such diameter as will cause it to contact with the arm 7' of the ordinary trip stop device, and when this contact occurs the trip stop is automatically operated to bear upon the periphery of the table 2 and arrest the movement of the same.

The laterally swinging movement of the arm 4 is due, as in ordinary practice, to the action of the needle point traversing the groove of the record. The arm 9' is arranged to strike the trip arm 7' when the needle reaches the outer edge of the seal of the record. This is accomplished by making a groove Y extending from the point where the record or music grooves stop at the circle X, to the seal Z Fig. 5. The radii of the seals of ten and of eight inch records vary, and in order to meet this condition I provide an adjustment in my automatic attachment to suit the size of the record. For this purpose I provide a spring arm 10 attached to the side of the arm 9' and adapted to be set in either one of two positions as shown in Figs. 3 and 4 by a pivoted finger piece 11. This finger piece is pivoted at 12 to the arm 9' so that when thrown into the position shown in Fig. 3 it will move the spring 10 away from the arm 9', whereas, if it is placed in the position shown in Fig. 4 it will allow the spring or arm 10 to assume a position close to the side edge of the arm 9'. In other words, I provide by this means, in effect, an arm capable of being narrowed or widened to contact later or earlier with the trip arm 7' according to the diameter of the record plate. When the finger piece 11 is in the position of Fig. 4 it allows the needle 3 to reach the seal before the arm 9', or more accurately speaking, the member 10 carried thereby comes in contact with the lever 7' of the tripping device, thus stopping the apparatus for eight inch record. When, however, the finger piece 11 is in the position shown in Fig. 3, the arm 9' strikes the trip arm 7' before the needle 3 arrives within the seal of ten inch records, thus stopping the machine for ten and twelve inch records.

In Fig. 2 I show the lever arm 7' in two different positions, one being in dotted lines. When it is in the position M, the turntable rotates and when it is pressed so that it jumps to the position N the turntable stops. All that the operator is required to do after moving the arm 7' to the position M Fig. 2 to

start the graphophone is to set the finger piece 11 to the position shown in Fig. 3, for stopping ten or twelve inch records or to set the finger piece in the position shown in Fig. 4 for stopping eight inch records.

In the foregoing description I have referred to the trip stop device as similar to that used on the Victor machine. Specifically, however, my device differs from that used on the Victor machine in that it is set to a hair trigger while that on the Victor machine is not, and my controlling lever works in the reverse direction from that on the Victor machine. My device may be used on the Victor or any other machine.

The supporting arm 8, instead of being of the right angular form shown, may be of any other desired shape.

I claim as my invention:

1. In combination with the trip stop device, an arm attached to the arm of the horn to contact with the trip stop device, said arm being adjustable to a plurality of different predetermined conditions for operating the trip stop earlier or later to suit the records of

different diameters and having means whereby said adjustment is arrested at said predetermined points, substantially as described.

2. In combination with the trip stop device, an arm attached to the arm of the horn and having means whereby its contacting end may be widened or narrowed to predetermined degrees to strike the trip stop device earlier or later, said means being thrown at once from one position to the other and there arrested substantially as described.

3. In combination with the trip stop device, an arm attached to the arm of the horn having a spring member 10 attached thereto to contact with the trip stop device and a pivoted finger piece to adjust the spring member 10 towards or from the side of the arm on the horn, substantially as described.

In testimony whereof, I affix my signature in presence of two witnesses.

JUNIUS WALLACE JONES.

Witnesses:

H. R. STRAUBE,
L. G. STIRLING.

L. F. DOUGLASS.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED MAR. 19, 1903.

902,280.

Patented Oct. 27, 1908.

Fig. 1

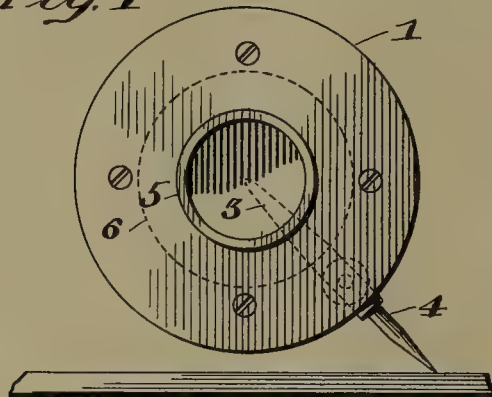


Fig. 2

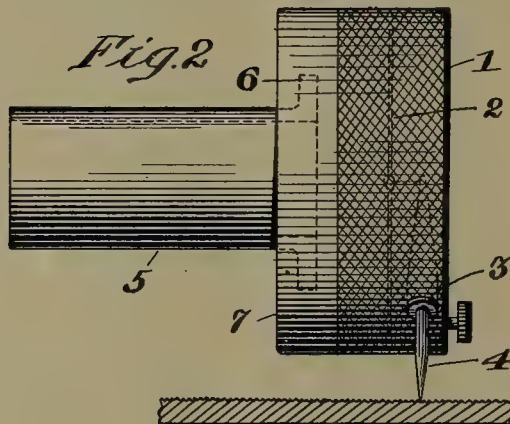
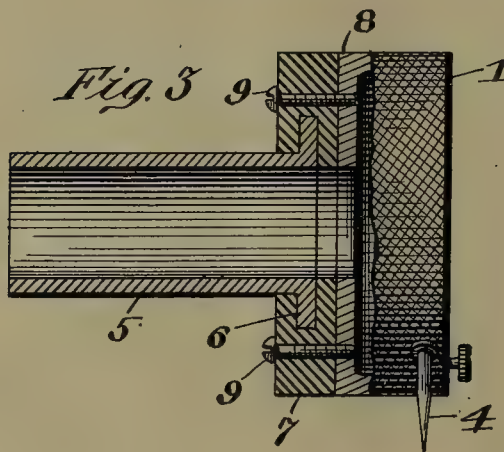


Fig. 3



WITNESSES:
F. J. Hartman.
Edw. W. Vaile Jr.

INVENTOR
Leon F. Douglass.
BY
Home Bell.
ATTORNEY.

UNITED STATES PATENT OFFICE.

LEON F. DOUGLASS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX FOR TALKING-MACHINES.

No. 902,280.

Specification of Letters Patent.

Patented Oct. 27, 1908.

Application filed March 19, 1903. Serial No. 148,478.

To all whom it may concern:

Be it known that I, LEON F. DOUGLASS, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a full, clear, and complete disclosure.

The object of my invention is to provide an improved construction, in, and relating to, sound boxes for talking machines, such that the quality and clearness of the sound produced thereby will be greatly improved, and whereby the action of the sound box, as concerns the effect of the vibrations of the stylus or needle caused by the record, will also be made more nearly perfect.

In the art relating to talking machines, and the recording and reproduction of sound waves, difficulty has been experienced in that the coarse and other vibrations of the sounds which have been recorded have been too great for the diaphragm of the sound box when reproduced from a disk record. These sounds composed of vibrations of greater amplitude also have been accentuated or made abnormally preëminent, so that the effect of the more delicate sounds and vibrations has been reduced, and the tone and quality of the reproduction thereby impaired.

The object of my invention, therefore, particularly relates to such a construction in connection with sound boxes that these harsh undesirable vibrations may be eliminated or reduced to such an extent that they retain the requisite intensity to give a pleasing effect when taken in connection with the other vibrations of less amplitude and greater frequency. It is evident that the inertia of the parts of the sound box, and the support therefor, to which the stylus bar and diaphragm are connected, have considerable effect upon the waves produced from the latter. That is, if the parts are held rigidly in position, the sound produced by the diaphragm will correspond exactly to the line traced by the stylus point, and if there are vibrations of greater amplitude and less frequency, such vibrations will be reproduced in substantially the same manner that they are recorded by the recording machine, and since sounds having waves of different amplitude are not all recorded with the same

ease and accuracy, the sounds which are most easily recorded will be accentuated in the reproduction. This is especially true of the coarser vibrations of the male voice and the notes of the larger wind instruments in bands and orchestras. It is also true of certain vibrations in the reproduction, which cause a hollow or tubby sound in connection with the music or words reproduced.

My invention is particularly intended to overcome the above mentioned defects.

I have found that when the sound box of a talking machine, or its casing, is mounted upon an elastic cushion or backing, so that said casing may move independently of the sound box support, the harsh vibrations which would otherwise be undesirably accentuated in some forms of reproducing machines and also the tubby sounds, have been eliminated. This result is occasioned by the relation between the inertia or mass of the metal of the sound box or its casing, and the amount of elasticity of the cushion or connection between said metal and the arm or support for the sound box. That is, when the stylus or needle follows the finer and more rapid sinuosities of the record groove, the inertia of the sound box is great enough to prevent the casing and diaphragm from moving or oscillating with the needle or stylus bar; but when the needle traverses the greater or coarser sinuosities, which must necessarily be of less frequency, the oscillating force is, therefore, greater, and at the same time slower and in acting upon the stylus bar and diaphragm causes the sound box or its casing to oscillate more nearly in synchronism therewith on a diameter at right angles to the stylus bar, instead of vibrating the diaphragm transversely as a whole. It will thus be seen that the diaphragm is not put under such a strain, nor is the same distorted to such an extent as to communicate the full force of the vibrations in the form of sound waves to the sound conveying means or amplifying horn.

Briefly my invention comprises the providing of an elastic cushion or connection between the sound box support or tube, and, the sound box or its casing, said cushions being of such a size, consistency, and form, and being held in such a manner that an elastic and yielding mounting is given to the sound box or the casing thereof, which al-

lows the same to be oscillated transversely about a central diameter or axis which is transverse to the axis of the sound box.

For a full, clear, and exact description of my invention, reference may be had to the following specification, and to the accompanying drawing forming a part thereof, in which

Figure 1 is an elevation of my improved sound box; Fig. 2, a side elevation thereof, and Fig. 3, a view showing the essential parts of the sound box, as concerns this invention, cut away and partly in section.

In the drawing, the numeral 1 indicates a sound box casing of the usual form, having a diaphragm 2, a stylus bar 3, and needle or stylus 4. The numeral 5 represents the sound box tube or support, which, in this instance, is formed cylindrically to correspond with one arm of the elbow of the usual amplifying horn. However, I do not wish to be limited to this form of support, as the elastic cushion may be adapted for use with other types of talking machines, such as that employing the pivoted hollow arm. The support or sound box tube 5 has at its inner end a low outwardly extending flange 6. The numeral 7 represents a perforated disk or ring having a groove therein to receive the flange 6 of the sound box support 5. This disk or ring is preferably made of soft rubber or similar elastic material, which is preferably molded about the flange 6, and slightly vulcanized or hardened in that position. The disk 7 may be attached to the back of plate 8 of the sound box casing in any convenient manner, such as by cement or other adhesive, as represented in Fig. 2, but I have shown the same also attached thereto by machine screws 9 which enter threaded holes in the back plate 8 of the sound box, as represented in Fig. 3. The manner of connecting the disk 7 with the sound box and with its support, is immaterial, provided that the volume or mass of the elastic material is unconfined so as to allow the same to be most easily distorted when the sound box casing oscillates in accordance with the coarser vibrations of the record groove.

In this instance the flange 6 should project as little as possible from the sound box tube, and the screws for attaching the yielding material to the sound box casing should leave a considerable amount of elastic material interposed between said flange and said screws, so as not to retain the parts in a too rigid relation. When these conditions are fulfilled, the movement of the casing and diaphragm absorbs and modifies many of the coarser vibrations without interfering with the quality or clearness of the sounds reproduced by the smaller waves, and also eliminates the tubby or hollow effect of reproduction. It will be noticed that the sound conveying tube or support is held in position

within the ring only by the low flange 6, while the screws or cement are the only means for attaching the flexible ring to the diaphragm holding portion of the sound box.

It is evident that the heads of the screws may be drawn into the yielding material of the ring when the casing oscillates, while the low flange 6 will easily distort the yielding material surrounding the same. For this reason a vibration of the casing does not have to distort or move the whole volume of the yielding material when the same moves in relation to the sound conveying tube. In the construction of sound boxes where rubber rings or bushings have been interposed between metallic rings or tubes, the effect is entirely different from that just referred to. In such instances, the volume or mass of the rubber or elastic material is not displaced except internally to a minute degree and at different independent points, and this displacement takes place in much the same manner that the particles of air are displaced in the direction of the travel of sound waves, when sound is being transmitted through the atmosphere. That is to say, rubber rings confined between metallic rings simply act as an insulation for the sound waves of high frequency, which it is desired to prevent from being transmitted to the support or tube, while the comparatively unconfined cushion or connection herein set forth in addition to acting as insulation to have sound waves of high frequency also prevents the passage of the coarser vibrations by allowing the sound box to oscillate with the stylus bar and diaphragm. Thus it is seen that the unconfined elastic mounting for the cylindrical casing or the part which carries the diaphragm and stylus bar, acts in the nature of an elastic pivoted support which allows the movement of said casing to conform to the coarser vibrations of the diaphragm and stylus bar, but, owing to the inertia of the casing permits the finer and more rapid vibrations to be transmitted to the diaphragm and thence to the amplifying horn through the sound conducting passages.

Among the advantages obtained by this construction, in addition to those already described, it will be evident that as the needle 4 follows the grooves of the sound record, said needle will fit the sound grooves with much more even pressure upon the walls thereof, by reason of the fact that resistance or rigidity of the sound box is less. This, of course, results in a much more even wearing of the needle, and also reduces the wearing of the walls of the record groove to a great extent. It has been found that a needle used with a sound box mounted as above described, will last many times longer than when used with a sound box mounted in the usual manner, and with much less deterioration of the sound record, which, of course, permits a

greater number of reproductions from such a record. The needle is also rendered much less liable to skip or jump certain waves of the record groove, because of their greater
 5 amplitude, which, of course, also aids in prolonging the life of the record.

I do not wish to be limited to the exact details of the form and arrangement of parts in the embodiment of my invention as herein
 10 set forth, for the same may be varied in many ways, which will still accomplish the results and advantages set forth, but

Having thus described the nature of my invention, what I claim and desire to protect
 15 by Letters Patent of the United States, is,—

1. In a talking machine the combination of the part of the sound box carrying the means for producing sound waves, a support forming part of the sound box and also forming
 20 a part of the sound conveying devices, and an interposed yielding member independently connected with said part and said support.

2. In a sound box for talking machines, a
 25 disk of india rubber attached to the back thereof, and a support which enters said disk and which has a low projection which is embedded therein to hold said disk and sound box upon said support, the outer surface of
 30 said disk being substantially unconfined.

3. In a sound box for talking machines, a disk of india rubber attached to the back thereof, a sound box support having a low flange which is embedded in said disk, the
 35 outer surface of said disk being substantially unconfined.

4. In a sound box for talking machines, a disk of india rubber attached to the back thereof, and a flanged sound box tube having
 40 its end embedded in said disk, the outer surface of said disk being substantially unconfined.

5. In a sound box structure a casing containing a diaphragm, a part of the sound box
 45 forming means for supporting the same, and a yielding member interposed between and independently connected with the said casing and supporting means.

6. In a sound box structure a casing containing a diaphragm, a part of the sound box forming sound conveying means for supporting the same, and a yielding member interposed between and independently connected with the said casing and supporting
 55 means.

7. In a sound box structure a casing containing a diaphragm, a part of the sound box forming sound conveying means for supporting the same upon a talking machine, and
 60 a yielding member interposed between and independently connected with the said casing and supporting means.

8. In a sound recording and reproducing mechanism, the combination with the part of
 65 the sound box structure carrying sound pro-

ducing means and the part thereof by which said means are supported, of a yielding member connected to the first mentioned means and independently connected with the last mentioned means.

9. In a sound recording and reproducing mechanism, the combination with the part of the sound box structure carrying sound producing means and the part thereof by which
 70 said means are connected with the talking machine, of a yielding member interposed and independently connected with the said parts, to enable the same to move relatively to one another.

10. In a sound recording and reproducing
 80 mechanism the combination with the part of the sound box structure carrying sound producing means and the part thereof by which said means are connected with the talking machine, of an elastic member interposed be-
 85 tween and independently connected with the said parts to enable the same to move relatively to one another.

11. In a sound box structure, a casing for the diaphragm, a part of the sound box forming a support therefor of an elastic cushion for said casing, comprising a member of elastic material which is independently attached to said casing and to said support, one of
 90 each of the opposite surfaces of which are substantially unconfined to permit distortion of said material.

12. In a sound box structure a casing, a part of the sound box forming a support therefor, an elastic member interposed between said casing and said support comprising
 100 a disk of yielding material, one flat surface of which is held in contact with said casing, the remaining surfaces being substantially unconfined to permit distortion.

13. In a sound box structure, the combination with the part carrying the diaphragm and the part by which the latter is connected to the sound conducting tube, of an elastic member interposed between and independ-
 110 ently connected with said parts.

14. In a sound box structure a casing carrying the diaphragm, a support therefor, and a disk of elastic material molded around a portion of said support for holding the same
 115 in connection therewith, one flat surface of said disk being held in contact with said casing.

15. In a sound box structure a casing carrying the diaphragm, a disk of elastic material attached to the back thereof, and a part of the sound box forming a support therefor
 120 embedded in said disk.

16. In a talking machine a sound box structure comprising a part carrying the
 125 sound producing means, a yielding disk contacting with the rear face of said part, and headed fastening pins rigidly connected with said part and passing through said disk, the heads of said pins serving to hold said part
 130

and disk in contact said pins being yieldably supported in said disk.

17. In a sound reproducing machine, the combination of a casing containing sound
5 producing means, a sound conducting tube, an element composed of elastic material interposed between said casing and said tube, and means for securing said element to said casing fixedly attached to said casing at one
10 end, and having enlargements at their other ends in contact with said elastic element.

18. In a sound reproducing machine, the combination of a casing containing sound
15 producing means, a sound conducting tube, studs located on said casing and a yielding material interposed between the heads of said studs, said casing and said tube, said heads being in contact with said yielding material.

20 19. In a sound box, the combination with a casing, of a yielding tubular extension secured to the rear side thereof, and a non-yielding lining in said yielding tubular extension,

the inner edge of said lining being out of contact with the rear side of said casing.

20. In a sound box, the combination with a casing of a yielding tubular extension secured to the rear side thereof and a non-yielding lining in said yielding tubular extension.

21. In a sound reproducing machine, the combination with a casing containing sound
30 producing means, a sound conducting tube, elastic means interposed between said casing and said tube, and means for securing said elastic means to said casing, fixedly attached
35 to said casing at one end, and having enlargements at their other ends in contact with said elastic means.

In witness whereof, I have hereunto set
40 my hand this 16th day of March A. D., 1903.

LEON F. DOUGLASS.

Witnesses:

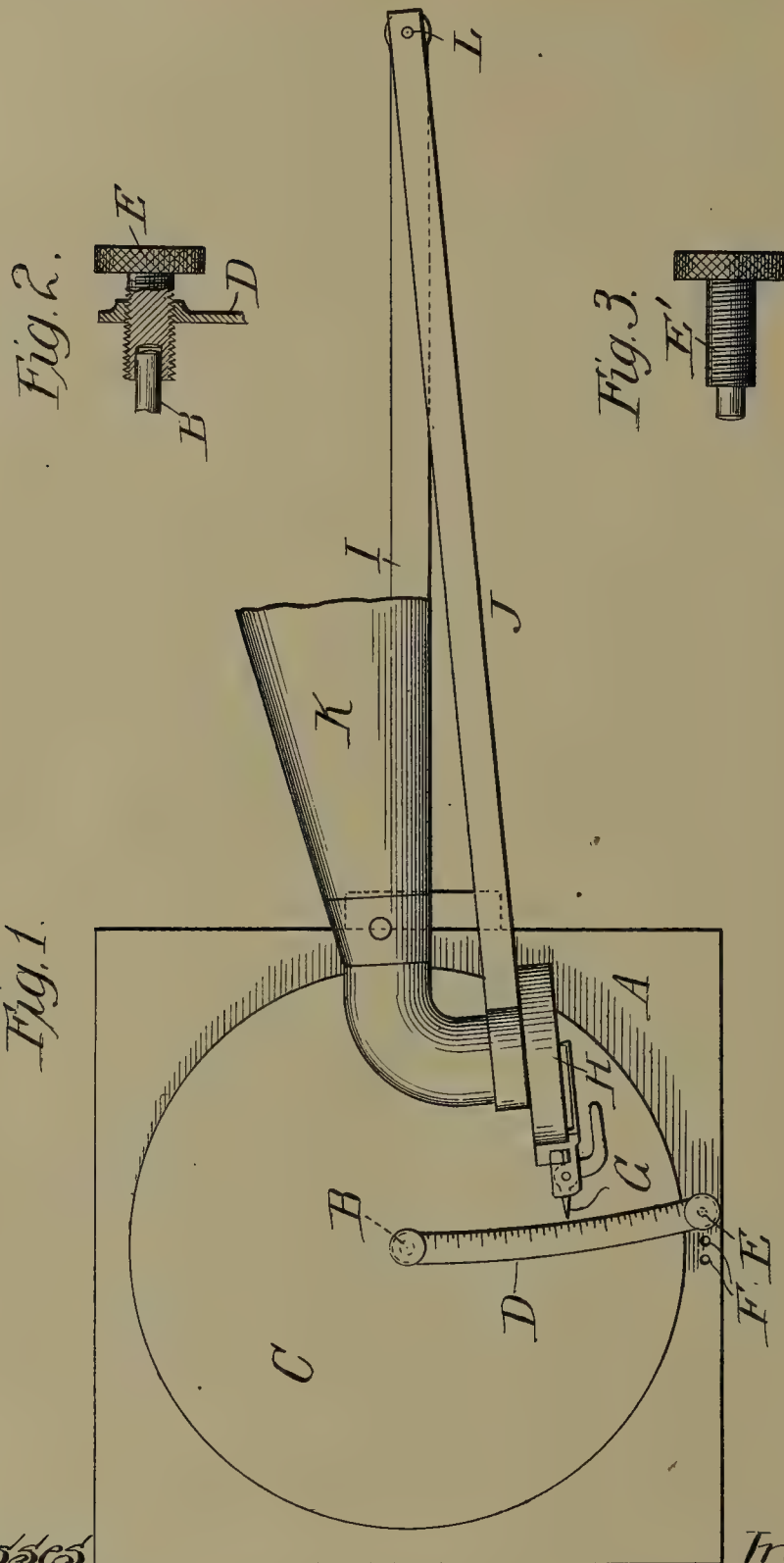
EDW. W. VAILL, Jr.,
LEWIS H. VAN DUSEN.

A. HENRY.
GRAMOPHONE.

APPLICATION FILED FEB. 21, 1908.

902,579.

Patented Nov. 3, 1908.



Witnesses

Harry R. L. White
R. A. White,

Inventor

Alice Henry

By Morgan & Rubinstein

Attys

UNITED STATES PATENT OFFICE.

ALICE HENRY, OF CHICAGO, ILLINOIS.

GRAMOPHONE.

No. 902,579.

Specification of Letters Patent.

Patented Nov. 3, 1908.

Application filed February 21, 1908. Serial No. 417,018.

To all whom it may concern:

Be it known that I, ALICE HENRY, a subject of the King of Great Britain, residing at 71 Park avenue, in the city of Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Gramophones, of which the following is a specification.

The object of my invention is to provide means whereby the needle point of the reproducer or reproducer can be instantly set at any desired radial point of the record disk for the purpose of utilizing all the surface of the disk where the recording is interrupted and needle removed from the disk; and for repeating any particular part of a record when the instrument is used for teaching or other purposes.

The manner in which I accomplish my object is described in the following specifications and illustrated in the accompanying drawing in which

Figure 1 is a top view of a box inclosing the mechanism; the record disk mounted thereon; the supporting bracket; the horn and reproducer and a scale supported above the disk adjacent to the line of travel of the needle. Fig. 2 is a detail showing an adjustable screw pivoted on the center shaft of the mechanism and supporting one end of the scale. Fig. 3 is a detail view of an adjustable screw pivoted in the top of the box and adapted to support the other end of the scale.

In the drawings A indicates the box containing the motor mechanism.

The dotted line B indicates the end of the vertical shaft on which the record disk C is supported and by which it is rotated.

D is a scale which is pivotally supported at one end on the shaft B, and at the other end is supported on the box A. In the end of the scale on the shaft is an adjustable screw E threaded in the scale and having a hollow end adapted to admit the end of the shaft B. At the other end of the scale is an adjustable screw E', the point of which is insertible in one of the holes F in the box A. By the adjustment of these screws the height of the scale D above the disk can be regulated.

The edges of the scale form part of a circle, the center of which is the pivotal point of the bracket and arm supporting the needle and horn. The face of the scale is divided by marks adapted to indicate any desired point on the disk at which the operator desires to set the needle.

The needle is indicated by the letter G. The reproducer by the letter H. The bracket by I. The arm by the letter J. The pivotal point by L and the horn by K. All of these parts except the scale and its adjustable screws are referred to simply as usual parts of the instrument of this kind.

What I claim and desire to secure by Letters Patent is:

1. In a gramophone, the combination consisting of a case and aperture therein; a motor mechanism in said case, a vertical shaft of said mechanism extending through said case, a bracket and pivotal arm supported by said case, a reproducer supported on said arm; a record disk supported on said shaft; a scale extending transversely over said disk, one end of said scale being pivotally supported on the end of said shaft and the other end supported in said aperture in said case as described.

2. In a gramophone, a case; a reproducer arm and reproducer support on said case; a motor mechanism in said case having a vertical shaft, a record disk thereon; a scale plate supported on said shaft and case transversely over said disk, one edge of said disk being coincident with an imaginary line traversed by a needle in said reproducer, as described.

3. In a machine of the kind described having a case, a reproducer arm and reproducer supported thereon, and motor mechanism inclosed therein, having a vertical shaft extending through said case, and record disk supported thereon, the combination therewith of a scale supported transversely over said disk, one edge of said scale being adjacent to a point of said reproducer when in contact with said disk; and means at each end of said scale adapted to hold it in position and to regulate its height above said disk, as described.

4. In a gramophone, the combination with
an inclosing case, pivotal arm and repro-
ducer thereon, motor mechanism therein
having a vertical shaft, and record thereon;
5 of an index plate supported transversely
over said disk adapted to indicate the posi-
tion of said reproducer on said record, and

means for adjusting the position of said
plate over said record and in relation to said
reproducer, as described.

ALICE HENRY.

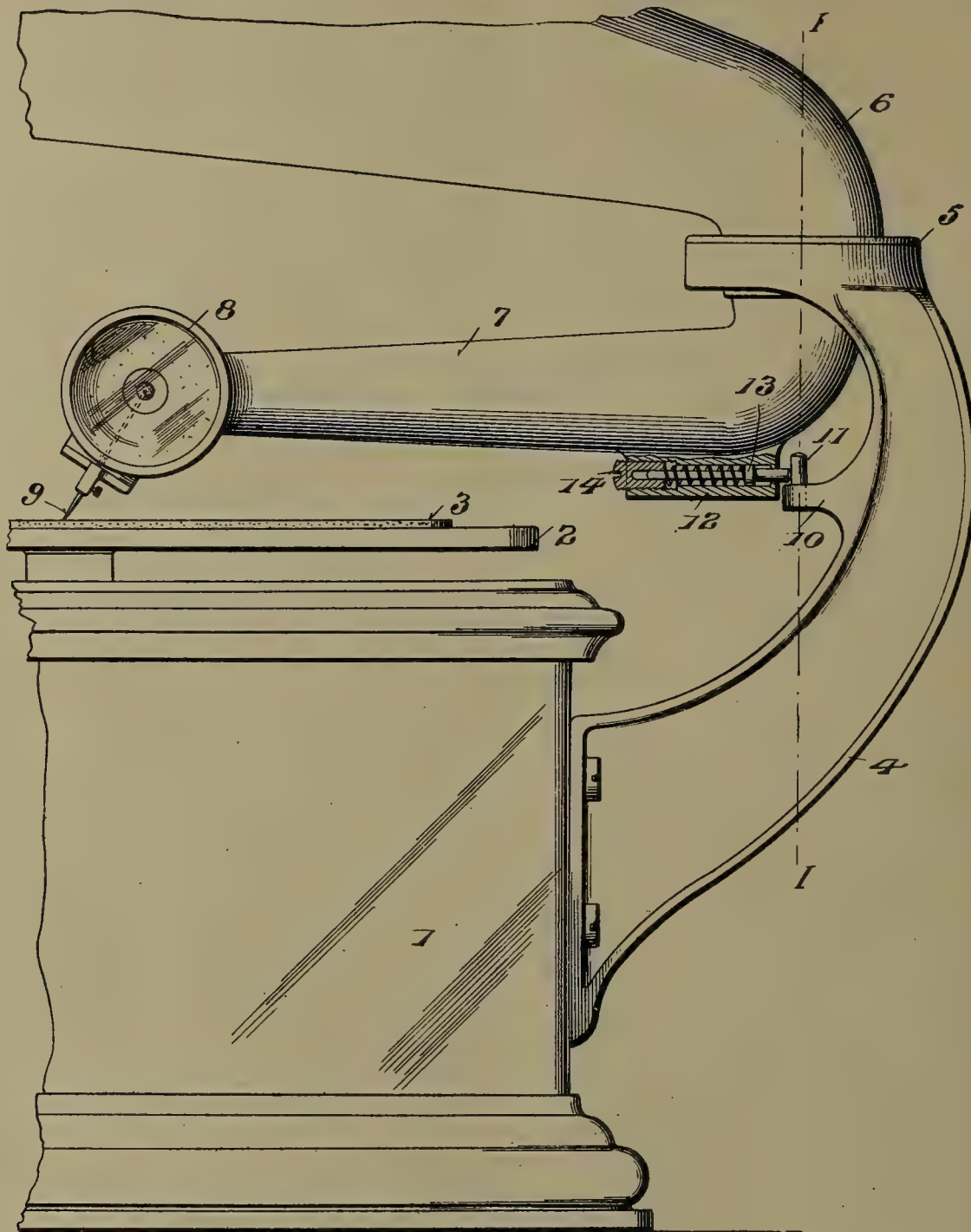
Witnesses:

THOMAS J. MORGAN,
JOSEPH STAAB.

T. H. MACDONALD.
DISK GRAPHOPHONE.
APPLICATION FILED FEB. 16, 1907.

902,590.

Patented Nov. 3, 1908.



Inventor

Thomas H. Macdonald

By Mauro, Cameron Lewis & Macrie

Attorneys

Witnesses

Ruth C. Fitzhugh
Frederick A. Hallen

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

DISK GRAPHOPHONE.

No. 902,590.

Specification of Letters Patent.

Patented Nov. 3, 1908.

Application filed February 16, 1907. Serial No. 357,699.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, a citizen of the United States, and a resident of the city of Bridgeport, State of Connecticut, have invented a new and useful Improvement in Disk Graphophones, which improvement is fully set forth in the following specification.

The invention relates to talking-machines employing records of the disk type, and specifically to that construction known as "tone arm", in which a bracket attached to the machine provides a horizontal bearing in which are independently journaled the horn and the hollow arm that carries the sound-box.

The invention consists of the construction and arrangement of parts as hereinafter set forth and claimed, and in modifications and colorable imitations thereof.

My invention will be best understood by reference to the accompanying drawing, which is a side view, partly broken away, illustrating one embodiment of my invention.

In this drawing 1 represents a portion of the box or casing of the graphophone or other talking-machine, containing the usual motor etc. 2 is the turn-table, and 3 a disk sound-record carried thereby. 4 is the bracket secured to casing 1 and providing, in its upper portion 5, a horizontal bearing in which the horn 6 is journaled or swiveled so as to be swung horizontally. 7 is the hollow arm or "tone arm" carrying the sound-box 8 and the stylus 9, and suitably mounted in the bearing 5, to have vertical as well as horizontal play. The members 6 and 7 are connected to the bracket 4, at the portion 5, in any suitable manner.

The construction thus far described is old and well-known. It will be observed that, the hollow arm 7 being pivoted at 5 to swing vertically, the weight of the other end of arm 7 and its sound-box 8 is sustained by the point of the stylus 9, that rests upon the surface of disk 3. The object of the present invention is to relieve the stylus and disk of a part of this weight. As one means of accomplishing this purpose, I provide two co-acting bearings, one on the bracket 4 and the other on the arm 7, preferably making one of them yielding, whereby a portion of the weight is taken up, and also preferably making one of them adjustable.

In the drawings, 10 represents an integral offset from bracket 4, in which is mounted the vertical cylindrical pin 11, preferably of hard steel. A horizontal barrel 12, preferably made integral with the arm 7, carries the spring-pressed bolt 13 that abuts against pin 11. At the other end of the barrel is the adjusting screw 14, for regulating the tension of the spring. As indicated by line I—I, the axis of pin 11 coincides with the axis upon which arm 7 turns in its horizontal movement; consequently, during every portion of the horizontal movement of the arm upon this axis, its spring-pressed pin 13 is in proper engagement against the concentric cylindrical pin 11. By turning screw 14 in or out, the tension of the spring is increased or lessened, and the weight upon the record 3 at the point 9 is lessened or increased, as the case may be.

Of course the spring-pressed member, or other yielding device might be carried upon the bracket-arm 4, instead of upon the hollow arm 7, and the adjusting element might be upon arm 7; or the parts might in other respects be altered in construction or in arrangement, without departing from the spirit of my invention, which consists of providing means for taking up a portion of the weight of the hollow arm so as to relieve the sound-record therefrom; in providing yielding means for this purpose, whereby any inequalities in the plane surface of the disk record 3 may be compensated for; and in making this means adjustable. By thus relieving the record 3 of weight, the hollow arm 7 or the sound-box, or both, may be made of iron or other cheap or convenient metal, in place of aluminum now commonly employed for this purpose.

Having thus described my invention, I claim:

1. In a talking-machine, the combination with a bracket, and the hollow arm secured in said bracket to carry the sound-box, of a device carried by said bracket, and a second device carried by said arm and abutting against said first-named device, whereby a portion of the weight of said arm is sustained,—said second device being both adjustable and also yielding when held in any position of adjustment.

2. In a talking-machine, the combination with a bracket, and the hollow arm secured

in said bracket to carry the sound-box, of a vertical cylindrical pin carried by said bracket in the axis of the horizontal movement of said hollow arm, a spring-pressed horizontal pin carried by said hollow arm and abutting against said vertical pin, and an adjusting nut for regulating the tension of the spring.

3. In a talking-machine, the combination with a bracket and an arm mounted thereupon and carrying the sound-box, of a convex bearing-surface upon said bracket, and a yielding device carried on said arm and abutting against said convex surface.

4. In a talking-machine, the combination with a bracket, and an arm mounted thereupon and carrying the sound-box, of a convex bearing-surface upon said bracket con-

centric with the swing of said arm, and an adjustable device carried upon said arm and abutting against said convex surface.

5. In a talking-machine, the combination with a bracket, and an arm mounted thereupon to swing in a horizontal plane and carrying the sound-box, of two abutting bearings carried respectively by the bracket and arm aforesaid, one of the said bearings being both adjustable and also yielding when held in adjusted position.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

A. B. KEOUGH,

C. A. GIBNER.

A. KANDALL.
 PHONOGRAPH STOPPING ATTACHMENT.
 APPLICATION FILED AUG. 17, 1908.

902,739.

Patented Nov. 3, 1908.

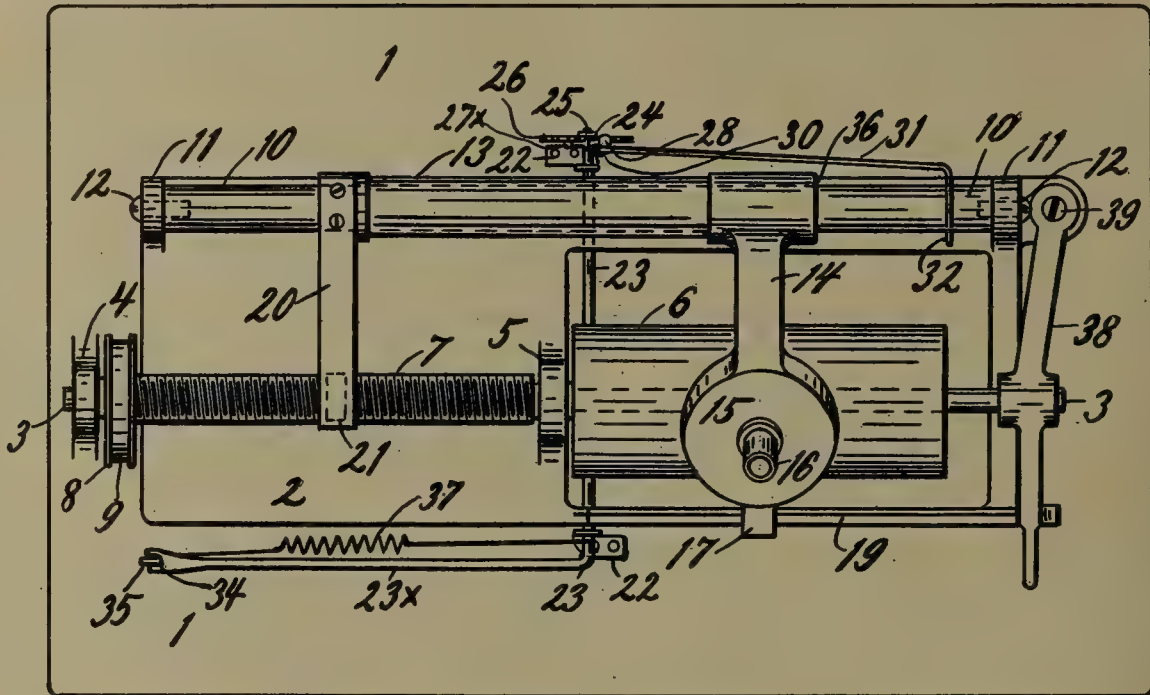


FIG. 1.

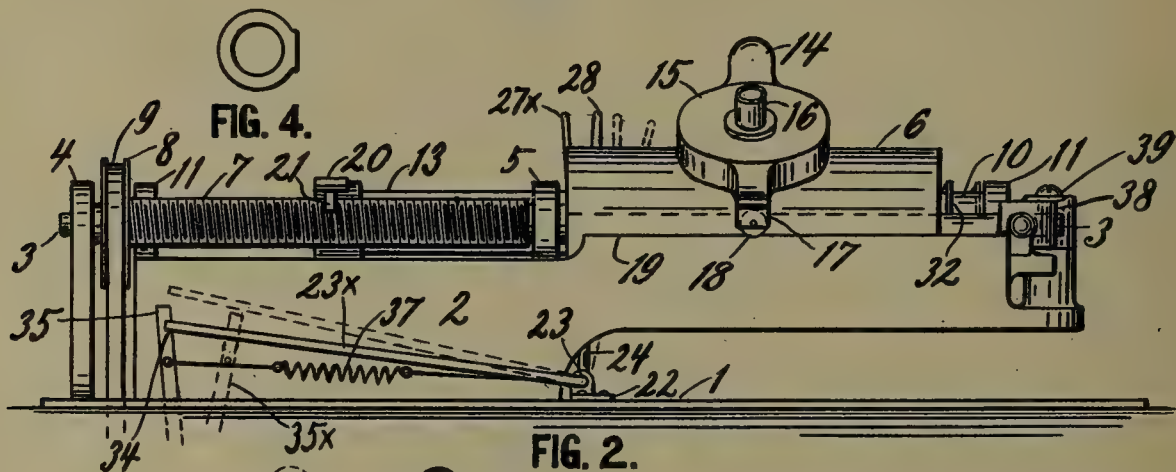


FIG. 2.

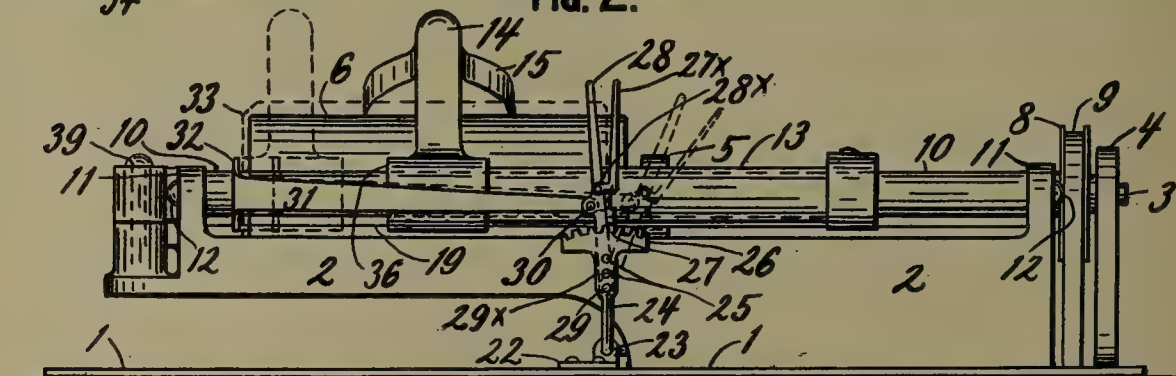


FIG. 3.

WITNESSES:

D. E. Carlson.
 W. W. Carlson.

INVENTOR:

Alfred Kandall
 BY HIS ATTORNEY:
 A. M. Carlson.

UNITED STATES PATENT OFFICE.

ALFRED KANDALL, OF FERRYVILLE, WISCONSIN.

PHONOGRAPH-STOPPING ATTACHMENT.

No. 902,739.

Specification of Letters Patent.

Patented Nov. 3, 1908.

Application filed August 17, 1908. Serial No. 448,837.

To all whom it may concern:

Be it known that I, ALFRED KANDALL, a citizen of the United States, residing at Ferryville, in the county of Crawford and State of Wisconsin, have invented a new and useful Phonograph-Stopping Attachment, of which the following is a specification.

My invention relates to improvements in phonographs, graphophones and other musical instruments, but will for convenience be called a phonograph stopping attachment.

The object of the invention is to provide a phonograph stopping device that will automatically stop the operating mechanism when the end of each record has been reached. This and other objects I attain by the novel construction and arrangement of parts illustrated in the accompanying drawing, in which:—

Figure 1 is a top view of the well known cylinder record type of phonograph with my stopping attachment applied thereto. Fig. 2 is a front elevation of Fig. 1. Fig. 3 is a rear elevation of Fig. 1. Fig. 4 is a detail view of the stop-collar which forms one of the main working parts of the device.

Referring to the drawing by reference numerals, 1 and 2 designate respectively the base and frame of a phonograph, which are often cast in one piece, the frame being offset upwardly about at the middle as best shown in Figs. 2 and 3.

The main shaft 3 is journaled in the bearings 4 and 5 and carries the cylindrical record holder 6, the screw threaded bar on screw 7 and the pulley 8 driven by belt 9, which is connected to the motive power (not shown) underneath the base plate.

Near the rear edge of the frame another shaft 10 extends the entire length of the machine parallel to shaft 3 and is fastened at each end to lugs 11 by means of screws 12.

On the shaft 10 slides a sleeve 13 having secured to one end the reproducer-carrying arm 14 and the reproducer 15 with tube 16 to which a horn (not shown) may be attached. Said arm has an extension 17 in front of the reproducer with a small wheel 18 journaled therein and resting on the track 19 of the frame. The opposite end of the sleeve has a transverse arm 20 projecting at right angles from it and having a threaded member 21 engaging the threads of the screw 7.

All of the above mechanism is common in the phonographs now used and said parts also constitute the mechanism that is used in

connection with my stopping device, which will now be described.

Near the offset of the frame I provide in the front and rear of the phonograph, bearings 22, in which is journaled a horizontally disposed rock shaft 23 having at its front end a horizontal rocker arm 23^x projecting toward the left of the machine and parallel to the front of it (as best shown in Figs. 1 and 2). The rear end of said shaft 23 has a short normally vertical arm 24 (see Fig. 3) to which is secured by rivets 25, a toothed sector 26 engaged by a catch 27 operated by a finger lever 27^x fulcrumed at 28^x to a hand lever 28, which is fulcrumed at 29 to the depending radial arm 29^x of the sector.

The lever 28 has pivoted to it at 30 one end of a horizontal controlling rod 31, extending to the left (in Fig. 3) and having its other end bent at an angle and formed into a collar 32 loosely encircling the shaft 10 to slide thereon. In Fig. 3 it is clearly shown that the collar 32 is located at a point opposite to the end of the wax cylinder 33 (shown in dotted lines). Should the cylinder be shorter or longer or the pieces to be reproduced are of different lengths as can be seen by looking at the sound producing spiral grooves in the cylinder, the collar 32 is brought to a point opposite the end of the cylinder or piece by placing the lever 28 with its catch 27 in a corresponding notch for reasons presently to be explained.

The front arm 23^x of the rock shaft 23 has its extremity provided with a vertical groove or notch 34, adapted to engage the common hand-operated stopping lever 35, which is pivoted underneath the base. Said stopping lever when pushed to the left sets the motive power in operation (by means not shown) and the belt over the pulley 9 turns the shaft 3 and thereby the screw 7 and the cylinder 6. The screw threads being engaged with the member 21, cause the sleeve 13 and its parts, including the reproducer 16 etc., to move toward the right (in Figs. 1 and 2) until the end 36 of the sleeve 13 takes against the collar 32. By the time this takes place the music piece has come to an end, but the sleeve continues to move thereby pulling on rod 31, which in turn pulls on lever 28 and arm 24, causing the shaft 23 to rock in the bearings, and the front arm 23^x to raise out of contact with the lever 35, allowing a spring 37, connected with the lever 35 and any suitable place near the front bearing, to pull the lever 35 to the po-

sition 35^x (see Fig. 2) thereby stopping the motor; and by means of the lever 28, rod 31, collar 32 and sector 26 the stopping takes place at the end of either long or short records, as already above explained. Swinging on a pivot 39 in the frame is a bearing 38 normally supporting the end of the shaft 3.

Having thus described my invention, what I claim is:

10 1. In a phonograph and mounted on the frame thereof, a rock shaft arranged in transverse position to the line of movement of the reproducer, a vertically disposed rocker arm on the rock shaft, an operating rod pivotally
15 connected therewith and having a guided portion adapted to be engaged by the member of the machine carrying the reproducer, also a horizontally disposed rocker arm on said shaft and adapted to normally hold the
20 starting lever of the machine in operative position, and a spring arranged to pull the starting lever into idle position when the horizontal arm is disengaged therefrom.

2. In a phonograph and mounted on the

frame thereof, a rock shaft arranged in transverse position to the line of movement of the reproducer, a vertically disposed rocker arm on the rock shaft, an operating rod pivotally connected therewith and having a guided portion adapted to be engaged by the member of the machine carrying the reproducer, also a horizontally disposed rocker arm on said shaft and adapted to normally hold the starting lever of the machine in operative position, and a spring arranged to pull the starting lever into idle position when the horizontal arm is disengaged therefrom, and adjusting means in the connection between the vertical rocker arm and the operating rod, for the variation in the lengths of records played.

In testimony whereof I affix my signature, in presence of two witnesses.

ALFRED KANDALL.

Witnesses:

MARIA TOWER,
MARY TOWER.

C. G. CONN.
SOUND REPRODUCING BELL.
APPLICATION FILED AUG. 2, 1907.

903,059.

Patented Nov. 3, 1908.

Fig. 1

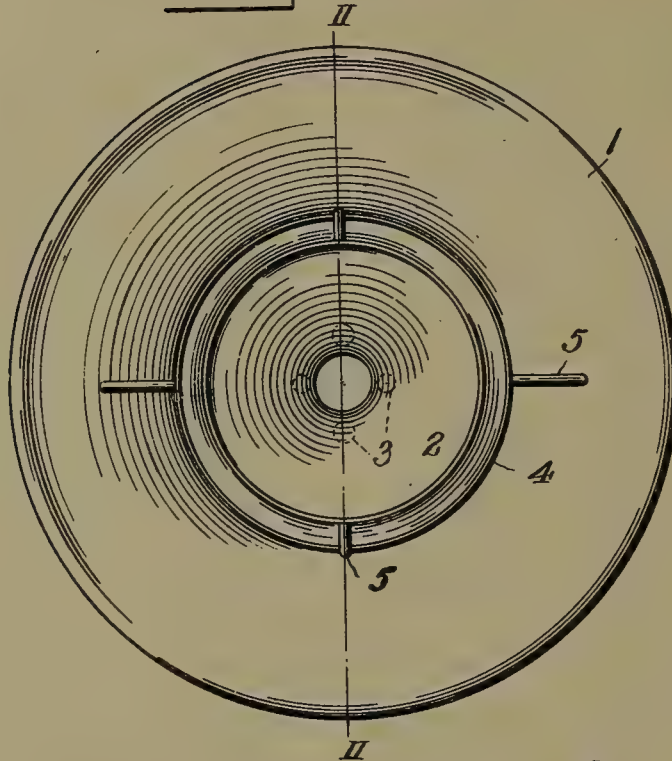
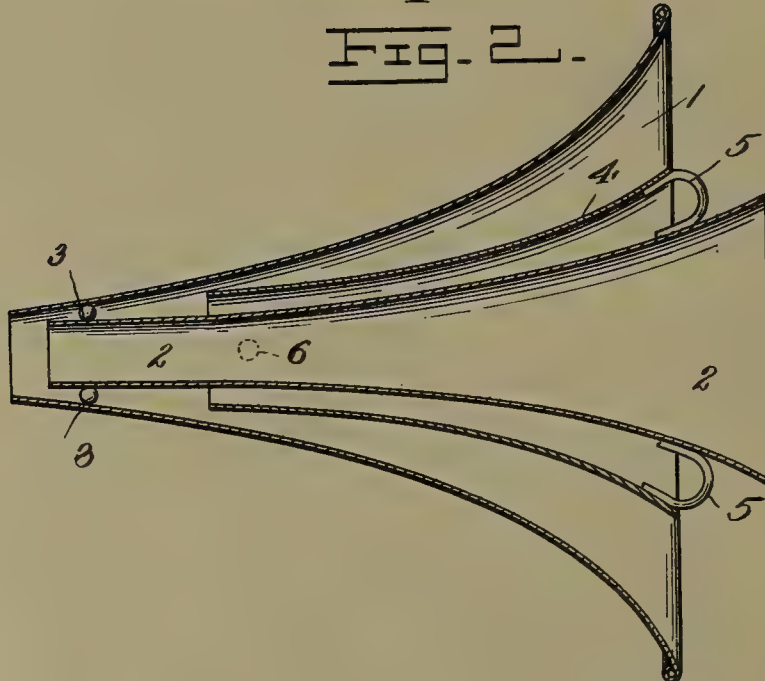


Fig. 2.



Inventor

Charles G. Conn

Witnesses

H. A. Totten.
J. M. Wyndkoop.

By

Knight Bros

Attorneys

UNITED STATES PATENT OFFICE.

CHARLES G. CONN, OF ELKHART, INDIANA.

SOUND-REPRODUCING BELL.

No. 903,059.

Specification of Letters Patent.

Patented Nov. 3, 1908.

Application filed August 2, 1907. Serial No. 386,806.

To all whom it may concern:

Be it known that I, CHARLES G. CONN, a citizen of the United States, residing at Elkhart, in the county of Elkhart and State of Indiana, have invented certain new and useful Improvements in Sound - Reproducing Bells, of which the following is a specification.

While I shall describe my invention more particularly with reference to sound reproducing machines, commonly known as gramophones and phonographs, at the same time it will be understood that my invention is equally applicable to megaphones and other sound conveying horns and the like. For purposes of brevity, I shall in this specification and the claims following use the term "bell" to include the horns usually employed on sound reproducing machines and, megaphones.

As is well known, there are three tones, namely, the upper, the middle and lower tones of the musical scale, and heretofore the varied vibrations of the different tones were all taken up in a single chambered bell, with the result that the vibrations of the higher tones are practically lost in a chamber of a size to properly reproduce the lower tone.

The object of my invention is to produce a bell having a series of sound wave chambers, whereby the full richness of the sound waves from the three tones is preserved and passes from the bell to the atmosphere; and with this and minor objects in view, my invention consists of the parts and combination of parts hereinafter more specifically set forth.

In the drawing, Figure 1 is a front elevation of the bell embodying my invention. Fig. 2 is a sectional view on the line II—II, Fig. 1.

The bell embodying my invention consists of the outer horn 1, the inner horn 2, which is secured to the outer horn at its inner end by means of fastenings 3; 4 is an intermediate horn disposed within the outer horn 1 and between it and the inner horn 2. This intermediate horn is secured to the inner

horn at its forward end by means of the loops 5, while at its inner end, it is secured to the inner horn 2 by means of suitable fastenings 6. As will be seen from the drawing, the inner horn 2 extends beyond the mouth of the horn 1, but does not extend to the rear end of the horn 1. The horn 4 is shown at its front end flush with the mouth of the horn 1, while its rear end terminates short of the rear end of the horn 2. These horns, as will be seen, are nested and at their rear ends terminate short of each other. When this bell is attached to a sound reproducing machine or is embodied in a megaphone, the lower tones pass out through the horn 1, while the middle tones pass through the horn 4, and the higher tones through the horn 2.

My theory is that where large bells are used for sound reproduction by the ordinary process, the sound wave chamber in the bell is too large for the feeble vibrations which reproduce the higher tones, and if a small sized bell is used, the sound wave chamber is too small for properly reproducing the lower tones. With the use of my nested bell, there is a sound wave chamber for the reproduction of the upper, middle and lower tones of the musical scale, and all can be reproduced with equal volume and clearness. The bell can be made of any material suitable for that purpose, or of any size found desirable by the manufacturer.

Claims.

1. A bell for conveying sound, comprising coaxially nested horns, terminating at different distances from the rear end of the bell.

2. A bell for conveying sound, comprising three coaxially nested horns for the upper middle and lower tones of the musical scale, the largest of said horns extending furthest to the rear, and the smallest extending furthest to the front of the bell.

CHARLES G. CONN.

In presence of two witnesses—

W. J. GROVERT,

M. E. MIDDLETON.

I. KITSEE.
PRODUCING PHONOGRAPHIC RECORDS.
APPLICATION FILED MAR. 6, 1908.

903,198.

Patented Nov. 10, 1908.

Fig. 1.



Fig. 2.



Fig. 3.

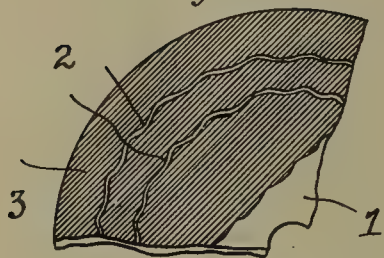
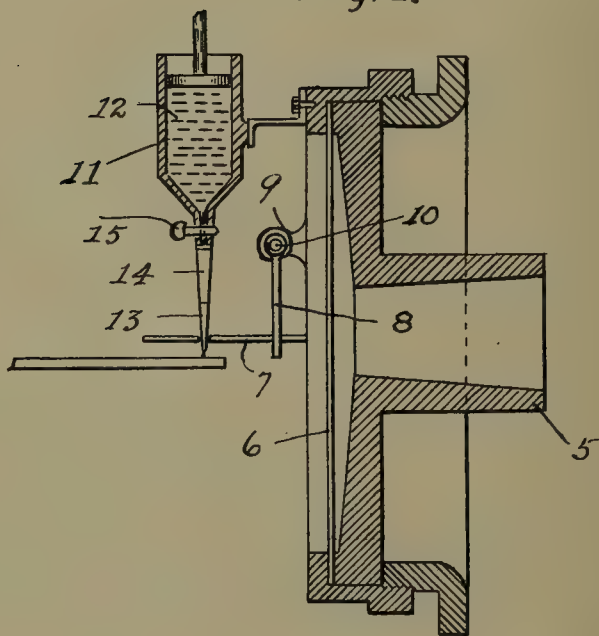


Fig. 4.



WITNESSES:

Edith R. Stille
Mary C. Smith

INVENTOR

I. Kitsee

UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA.

PRODUCING PHONOGRAPHIC RECORDS.

No. 903,198.

Specification of Letters Patent.

Patented Nov. 10, 1908.

Application filed March 6, 1908. Serial No. 419,576.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Producing Phonographic Records, of which the following is a specification.

My invention relates to an improvement in producing phonographic records. Its object is to produce such records in a simple and efficient manner.

In practicing this, my invention, I prefer to make use of a vibrating diaphragm with the aid of which a non-conducting material is deposited on a conducting surface in accordance with the vibrations of said diaphragm produced by the generated sound waves.

In the drawing Figure 1 is a plan view in conventional form illustrating the conducting material on which the lines of record are later on to be marked. Fig. 2 is a similar view of the same material with the sound record marked thereon. Fig. 3 is a similar view of the conducting material having marked thereon the lines of record and provided with the electro-plate as later on to be more fully explained. Fig. 4 is a cross section of a recording mechanism provided with the preferred means of depositing the material on the conducting plate.

1 is the conducting support; 2 the lines of record and 3 the electro-deposit on said plate.

In Fig. 4, 5 represents the mouth piece; 6 the diaphragm; 7 the stylus attached to the diaphragm. This stylus is here partially supported by the movable lever 8 attached to the bar 9 held in position here by the support 10. 11 is the reservoir containing the non-conducting fluid 12. 13 is the fluid outlet here shown as connected with the reservoir with the interposition of the flexible tube 14. 15 are the means to stop the flow of the fluid.

The *modus operandi* of practicing this, my invention, is as follows:—A metallic plate, such for instance as a plate of copper, is first prepared in a manner so that the surface of same is adapted to receive a deposit of metal with the aid of an electric current. For this reason, the plate has to be free from all grease and foreign substances. A non-conducting material is then deposited on this plate with the aid of the

vibrating diaphragm of a phonographic transmitter. As stated above, I prefer that this material should be deposited without necessitating the actual contact of the stylus with the plate whereon such material has to be deposited. I, therefore, produce a liquid or fluid in a manner so that the same should be non-conducting. I have tried different fluids and found that either a solution of shellac in alcohol, or a solution of rosin in hydrocarbon will answer for all practical purposes.

I prefer that the stylus, which is supported by the vibrating diaphragm of a recorder, should be provided with an orifice and should be in operative relation with a reservoir containing the necessary liquid or fluid. Beneath this orifice, I place the metallic plate adapted to receive the record. The non-conducting fluid or liquid should issue from the reservoir in a very thin stream; and as the stylus with its orifice has to vibrate in accordance with the vibrations of the diaphragm proper, it is obvious that the liquid or fluid will be deposited on the solid surface in a manner so as to reproduce these vibrations. After having deposited thereon the required recording lines, the conducting plate is subjected to the process of electroplating. As again stated above, I prefer to use a copper plate and I also prefer to electro-plate the same with an additional copper. The mode of producing such electro-deposition is well known. The plate is made the cathode in an electrolytic apparatus in which the electrolyte consists of a solution of sulfate of copper. This anode is a copper in convenient form. When a plate, prepared as above, is subjected in such apparatus to the action of the current, the copper will be deposited only on such parts of the surface of this plate as are conducting, but such parts as are made non-conducting, will be left free from the deposit; and as the lines of record are non-conducting, it is obvious that these lines will remain free from the deposit. A plate therefore, having the lines of record marked on its surface with a non-conducting material will, after it is taken from the electrolytic apparatus, have all parts of its surface with the exception of such parts which represent the lines of record, raised. The height between the lines of record and the other parts of the plate will, therefore, be differentiated and the lines of record them-

selves will look as being in intaglio or depressed as to the other parts of the surface. From such a plate, copies can then be made in accordance with any of the well known methods.

I have illustrated and described one apparatus with the aid of which the lines of record may be drawn on the metallic support, but it is obvious that other apparatuses may be substituted and I have only illustrated the one apparatus so as to enable persons versed in the art to practice my invention.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The method of reproducing sound waves in permanent records, which consists in causing a non-conducting material to be deposited on a conducting material in accordance with the vibrations of a diaphragm actuated by said sound waves, and causing

to be differentiated the height of the lines of record and the height of the remaining parts of the surface of the conducting material through the process of electro-deposition.

2. In the production of sound records, the method which consists in first recording the sound waves upon a suitable surface, and electro-plating upon the parts of the surface upon which no record has been made.

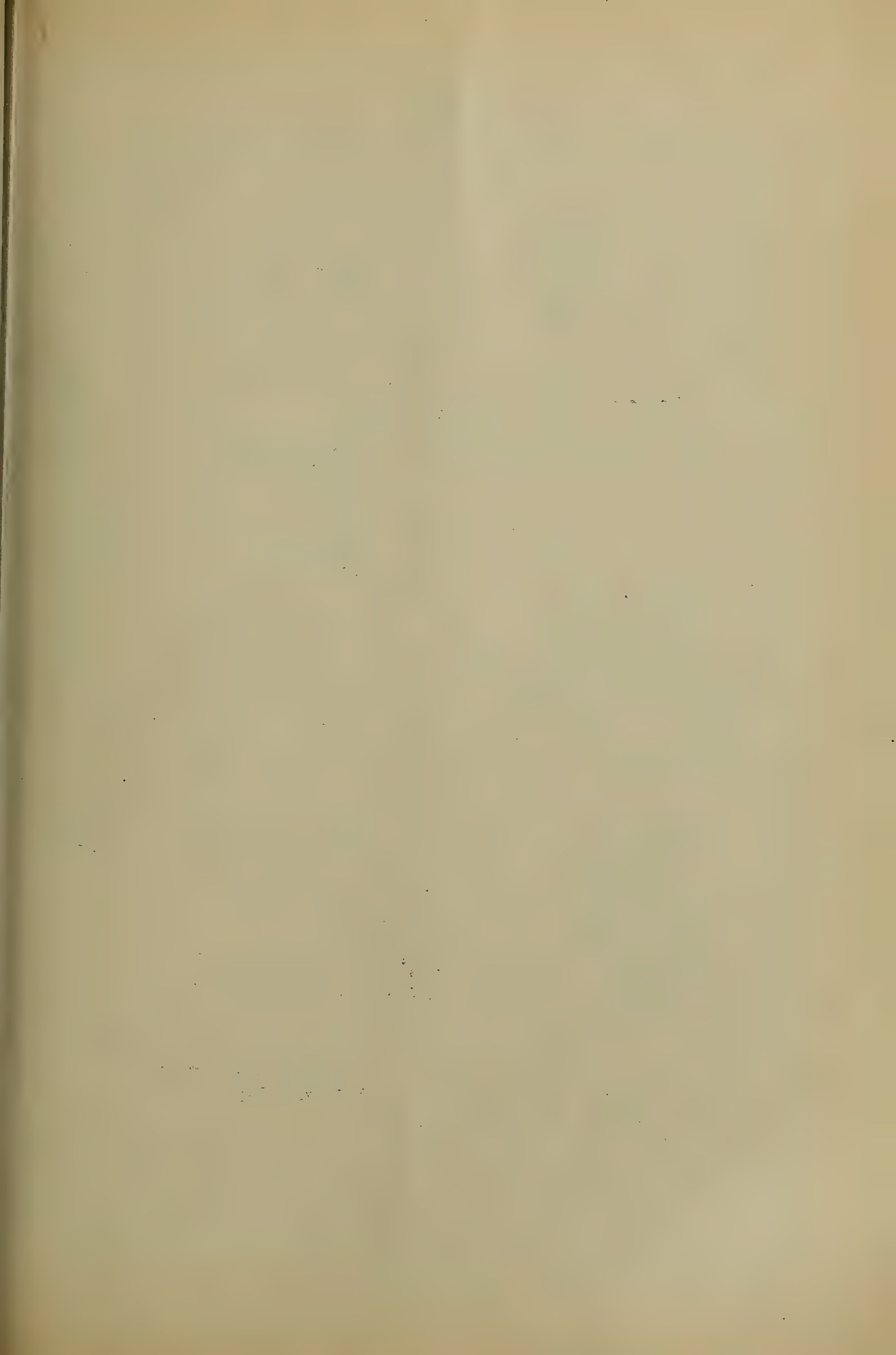
3. As a new article of manufacture, a phonographic record comprising a conducting support, lines of record thereon and a metallic deposit on all parts of the surface of said support with the exception of those parts which are covered by the lines of record.

In testimony whereof I affix my signature in presence of two witnesses.

ISIDOR KITSEE.

Witnesses:

EDITH R. STILLEY,
MARY C. SMITH.



I. KITSEE.

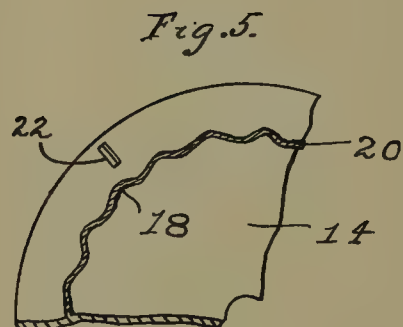
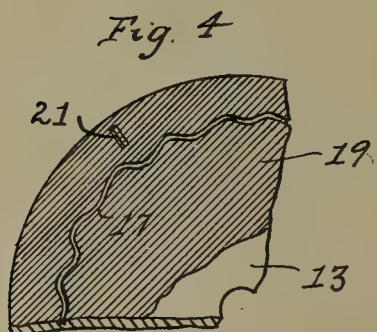
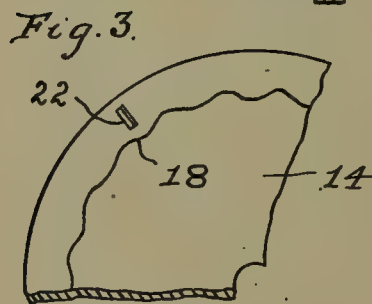
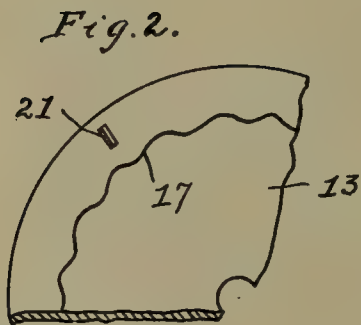
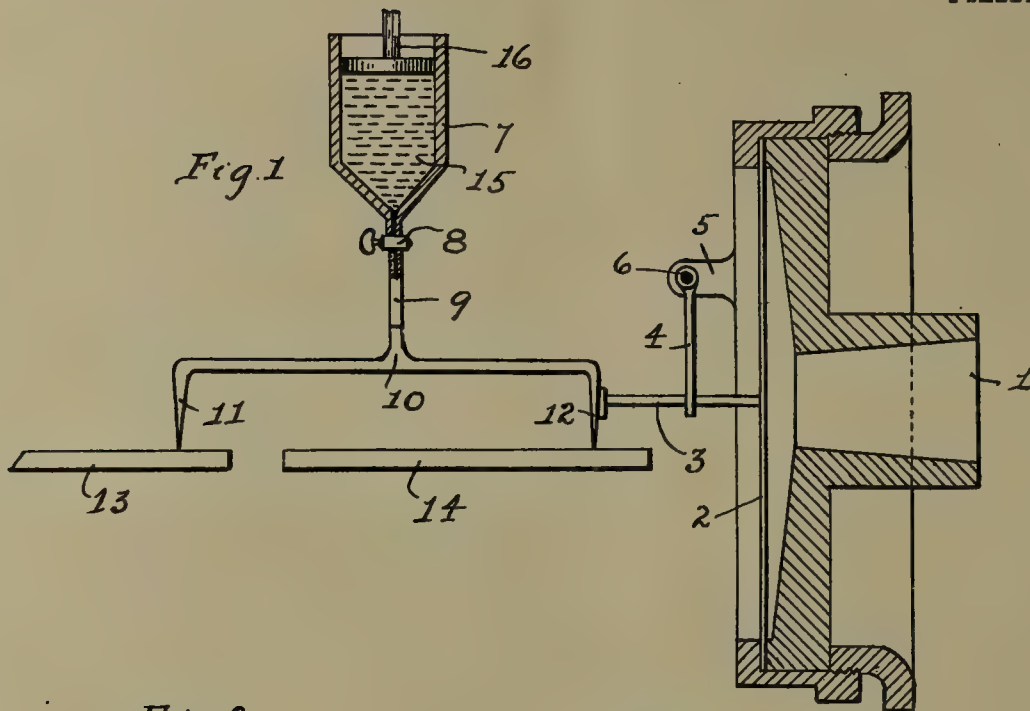
PHONOGRAPHY.

APPLICATION FILED MAR. 12, 1908.

903,199.

Patented Nov. 10, 1908.

2 SHEETS—SHEET 1.

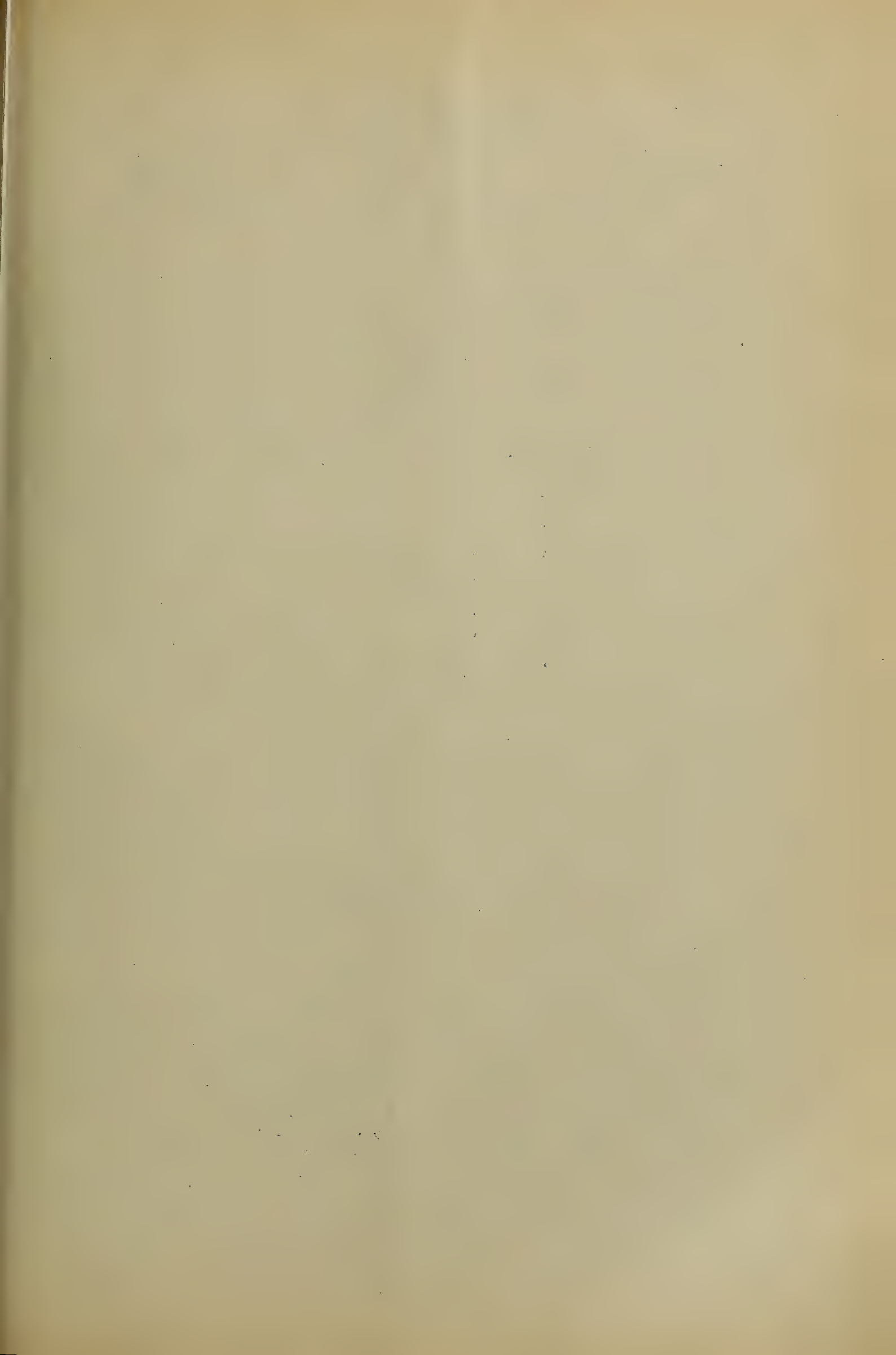


WITNESSES:

Edith R. Stillee
Mary C. Smith

INVENTOR

I. Kitsee

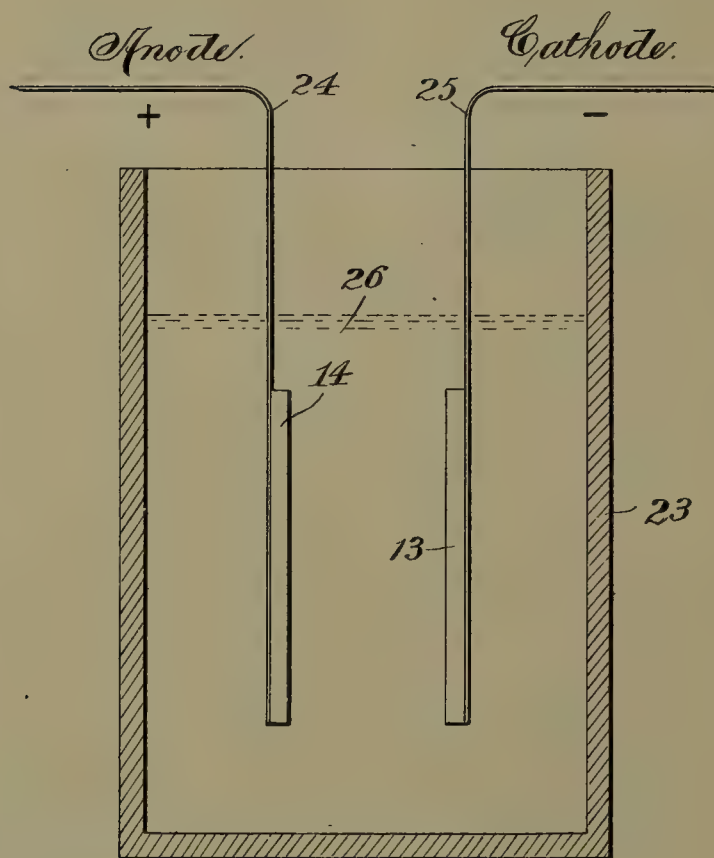


903,199.

Patented Nov. 10, 1908.

2 SHEETS—SHEET 2.

Fig. 6.



Witnesses:

James Hutchinson
Theresa O'Donnell

Inventor:

Isidor Kitsee
By *John A. C. [Signature]* Attorney:

UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA.

PHONOGRAPHY.

No. 903,199.

Specification of Letters Patent.

Patented Nov. 10, 1908.

Application filed March 12, 1908. Serial No. 420,713.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Phonography, of which the following is a specification.

My invention relates to an improvement in phonography. Its object is to produce original records in a simple and efficient manner and it is also one of its objects to produce direct from said original records copies of same.

The first step in practicing my invention is to produce the original record. I prefer that the lines of record should be marked on the support without actual contact of the stylus or writing means and as it is necessary for me to illustrate mechanical means adapted to produce such lines of record, so that persons versed in the art may practice my invention, I have illustrated in the accompanying drawing a device with the aid of which records may be produced without actual contact of the stylus with the material on which the lines of record are to be produced, it being obvious that the mechanical arrangement may differ without departing from the scope of my invention.

In practicing my invention, it is necessary to produce two identical records and I have, therefore, recourse to means whereby identical lines of record may be simultaneously produced on two independent plates or disks.

In the drawing, Figure 1 is a cross section of a recording mechanism with my device attached thereto. Figs. 2, 3, 4 and 5 are perspective views of plates having marked thereon the lines of record in their different stages. Fig. 6 is a vertical transverse sectional view of an electrolytic apparatus employed in practicing the invention.

In Fig. 1, 1 is the mouth piece of the usual sound-box; 2 the diaphragm; 3 the stylus attached to the diaphragm. This stylus is here partially supported by the movable lever 4 attached to the bar 5 and held in position by the support 6.

So far, the device may be a duplicate of the usual phonograph but instead of the stylus being provided with a cutting point, I substitute therefor means to move therewith a device whereby proper material may be deposited on the plate or disk without actual contact with said plate or disk.

7 is a reservoir containing the liquid 15. 8 are the means to regulate the flow of the liquid from said reservoir and 16 are the means to provide pressure to said liquid. To the outlet of this reservoir is connected a flexible tube 9 and to this tube is connected the pipe 10 provided with the two orifices 11 and 12. One of these orifices is of somewhat larger dimension than the other, so that a broader line can be traced or marked with one of the orifices than with the other. In juxtaposition to the orifice 11 is the plate or disk 13 and in juxtaposition to the orifice 12 is the plate or disk 14.

The fluid or liquid should be non-conducting and it is even preferred to make the same etch-resisting for the purpose as will hereinafter be described. The liquid should issue from the reservoir in a very thin stream, and as the orifices have to vibrate in accordance with the vibrations of the stylus, due to the vibrations of the diaphragm, which vibration of the orifices is permitted by the flexible tube 9, it is obvious that the liquid or fluid will be deposited on the solid surface in a manner so as to reproduce these vibrations. In this connection it will be understood that a relative movement between the reservoir 7 and the disks 13 and 14 should occur, that the reservoir may conform to the feed of the sound-box, and to this end the reservoir 7 should be properly supported in relation to the sound-box so that proper movement of the reservoir across the disks 13 and 14 may be had.

To practice my invention, it is, as stated above, necessary to produce two identical records and in Figs. 2 and 3 I have illustrated these records in which the plates or disks are designated by the numerals 13 and 14 and the lines of record by the numerals 17 and 18 respectively. After the production of the two records, I subject one of these records to a process whereby the lines of record are left in "intaglio", that is, depressed, and I then subject the second of said records to a process whereby the lines of record are produced in "relief", that is, raised above the surface.

In my experiments, I have found that to accomplish this purpose in a simple and efficient manner, it is only necessary to make one of these records the anode and the second of these records the cathode in an electrolytic apparatus with the necessary electrolyte. In Fig. 6 I have disclosed such electrolytic

apparatus, the numeral 23 designating the cell thereof; 24 the anode; 25 the cathode, and 26 the electrolyte. The disk 13 is illustrated in connection with the cathode, and the disk 14 in connection with the anode, and by reason of this it is apparent that the electrolytic action will cause a metallic deposit upon the free surface of the disk 13, while the free surface of the disk 14 will be eaten away.

It is necessary that the plate or disk on which the lines of record are marked should consist of a conducting material, such as metal, and if the plates or disks are made of copper, it is best to have as an electrolyte a diluted copper solution. Care should be taken to carry only a very small amperage through the apparatus, so that the force of the current should not be able to destroy the lines of record on the anode and I have found one-tenth of an ampere for each square inch of surface exposed sufficient for practical purposes.

Through this process, copper is deposited on the free surface of the cathode, raising this surface and leaving the lines of record in their original state, whereby these lines of record are—for all practical purposes—depressed or in intaglio, and the copper of the free surface of the anode is eaten away leaving again the lines of record in their original state, and through the eating away of the other parts of the surface of the plate, the lines of record are—for all practical purposes—raised above the remaining surface and are therefore in relief. To produce copies from such records, it is only necessary to use one of the records as a "male" and the second of the records as a "female" and compressing the necessary material, such for instance as celluloid, etc., between the two disks.

To bring the lines of record entirely in alinement, I have provided the records with means so as to lock the same at the required place and these means are here shown as 21 and 22; one of these means being raised and the other depressed.

I am well aware that instead of producing the records in relief from a metallic plate, the same results can be obtained by the process of etching, but as some metals lend themselves far better to the electrolytic process than to the etching process, it is obvious that one or the other may be practiced in accordance with requirements.

In my experiments, I have found that it is necessary to have the recording lines of one record slightly broader than in the second

record, for the reason that one of these records is then used as a male and the other of these records is used as a female and the materials, from which the copy is to be made, has to be compressed between the two records.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In phonography, the method, which consists in causing, through the sound waves, a diaphragm to vibrate, causing through said vibrations a non-conducting material to be deposited simultaneously on the surfaces of two separate conductors, in accordance with the vibrations of said diaphragm, and causing then the free surface of one of said conductors to be depressed and the free surface of the second of said conductors to be raised.

2. In phonography, the method of producing male and female dies from original records, which consists in first producing simultaneously two original records, and then raising the free surface of one record and depressing the free surface of the second record through the action of the current in an electrolytic apparatus.

3. In phonography, the method, which consists in first producing simultaneously identical recording lines on two independent conductors with a non-conducting material, and then making said records the anode and cathode, respectively, of an electrolytic apparatus whereby the free surface of one of said conductors is raised and the free surface of the second of said conductors is depressed.

4. The method of producing phonographic records, which consists in simultaneously forming two independent die records the lines of one of which are in relief and the lines of the other depressed to adapt the same as male and female dies, and then compressing a suitable material between said die records to obtain the requisite copies.

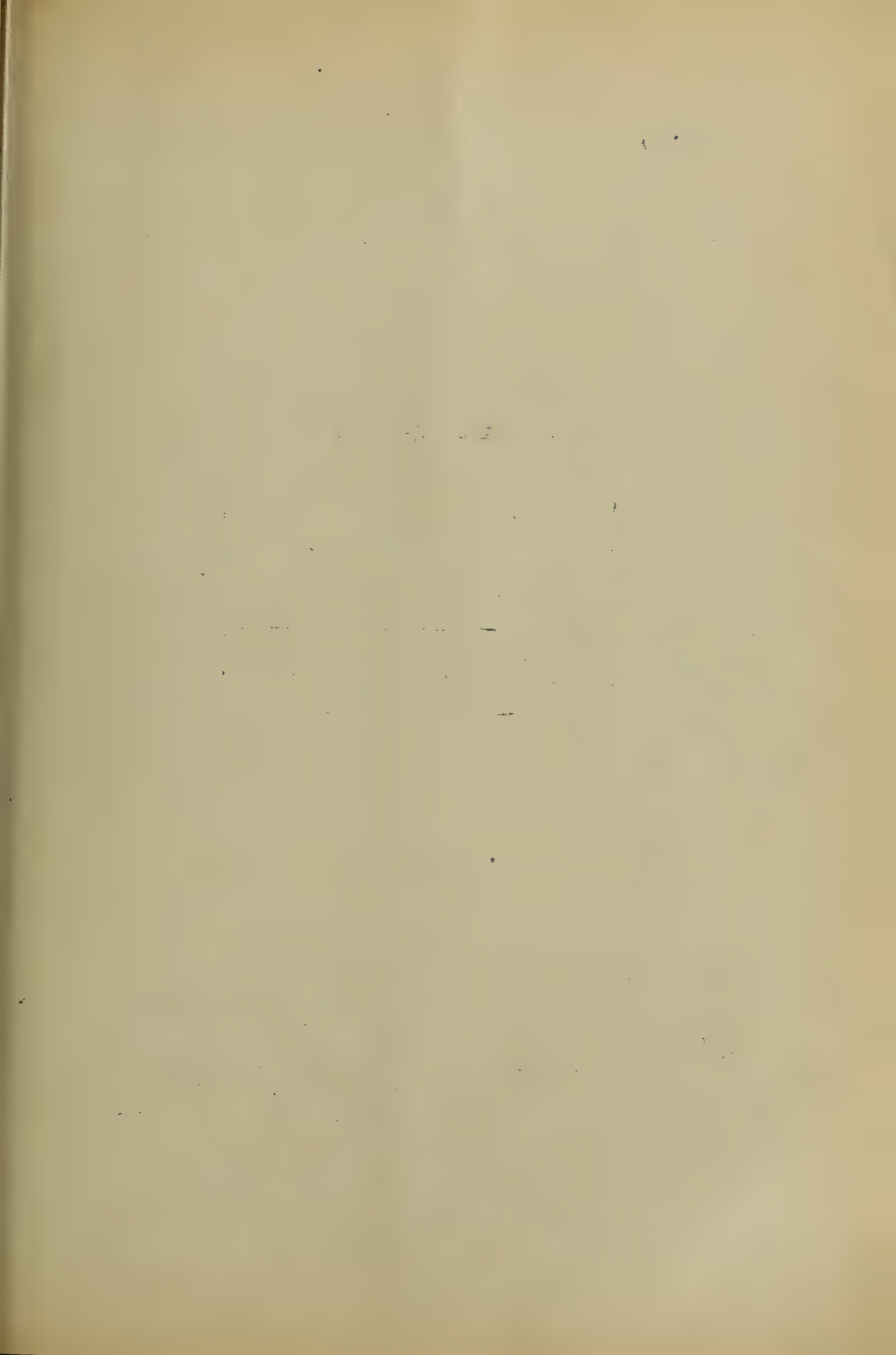
5. In phonography, the method of producing dies from original records, which consists in making one of said records the anode and one of said records the cathode in an electrolytic apparatus, and sending currents of electricity through said apparatus, whereby the free surface of one of said records is raised and the free surface of the second of said records is depressed.

In testimony whereof I affix my signature in presence of two witnesses.

ISIDOR KITSEE.

Witnesses:

EDITH R. STILLEY,
MARY C. SMITH.

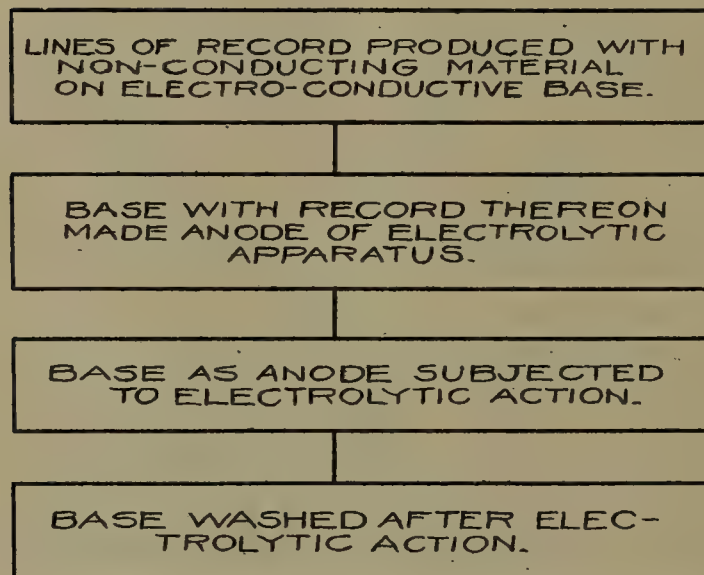


I. KITSEE.
PHONOGRAPHY.

APPLICATION FILED JUNE 11, 1908.

903,200.

Patented Nov. 10, 1908.



Witnesses

T. L. Moench
N. E. Smith

Inventor

Igor Kitsee

By *John A. Brown*
Attorney

UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA.

PHONOGRAPHY.

No. 903,200.

Specification of Letters Patent.

Patented Nov. 10, 1908.

Application filed June 11, 1908. Serial No. 437,924.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Phonography, of which the following is a specification.

My invention relates to an improvement in phonography. Its object is to produce permanent records in a simple and efficient manner.

The first step in practicing my invention is to produce the lines of record with a non-conducting material on a conducting support.

For the purpose of my invention, it is immaterial if the non-conducting material consists of a fluid or a solid and it is immaterial if these lines of record are marked on the support with actual contact of the stylus or writing means, or without actual contact of said stylus; but it is necessary that the support should be conducting and the lines of record non-conducting, and I prefer that the support should be a metallic plate, such for instance as a plate of copper, and if a fluid is used for making the lines of record, the same may consist of a liquid containing dissolved shellac or other resinous matter, and it is preferred that this fluid should be colored so that the lines of record may be made visible to the eye of the operator.

After the lines of record have been produced and the ink (if such is used) has dried, the plate with its record lines is made the anode of an electrolytic apparatus, and if a copper plate is employed, the electrolyte should preferably consist of a diluted solution of sulfate of copper. The cathode may consist of any suitable material in any preferred shape. When a current of electricity is sent through this apparatus, such parts of the cathode as are left free from the recording lines will be eaten away and such parts as are covered by the non-conducting lines are left in their original state.

When it is found that the spaces between the lines are deepened enough, then the plate is taken out and washed, and may be used to produce copies therefrom.

I am aware, that records have been pro-

duced on metallic plates with a material adapted to resist the action of an etching fluid and that then the plate is subjected to a process whereby the material left free is eaten out—so to speak—by the acid, but in practice, it was found that even the improved etching processes are not capable of producing a clear demarcation between the lines and the etched out material and when such plates are subjected to microscopic examination, it is found that the edges of the line are ragged and the sound produced from such records is not as clear as desired.

Experiments have proven that if instead of the etching fluid, the action of the current is made to differentiate the height between the lines of record and the other parts of the plate, the lines are more clearly defined and do not have the ragged edges as with the etching process.

Different densities of current may be used, but I found that it is best to use a very small amperage, such for instance as one ampere to ten square inches exposed. The smaller the current, the longer time is required to produce the necessary result.

In the accompanying drawing is disclosed a diagram illustrating the steps of the here- in described method.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The method of producing permanent sound records, which consists in first forming on an electro-conductive base a variable line of non-conducting material in accordance with the variations of sound waves, then making said base the anode of an electrolytic apparatus, and subjecting the base, while still the anode of the electrolytic apparatus, to the action of a current of electricity flowing through said apparatus.

2. The method of producing permanent sound records, which consists in first forming on the surface of a metallic plate a variable line of non-conducting material in accordance with the variations of sound waves, and then causing the free surface of said plate to be ionized through the action of an electric current in an electrolytic apparatus.

3. The method of producing permanent sound records, which consists in first form-

ing on an electro-conductive base a variable
line of non-conducting material in accordance with the variations of sound waves, and
then differentiating in height the lines of
5 record and the free surface of said base
through the ionizing action of an electric
current in an electrolytic apparatus.

In testimony whereof I affix my signature
in presence of two witnesses.

ISIDOR KITSEE.

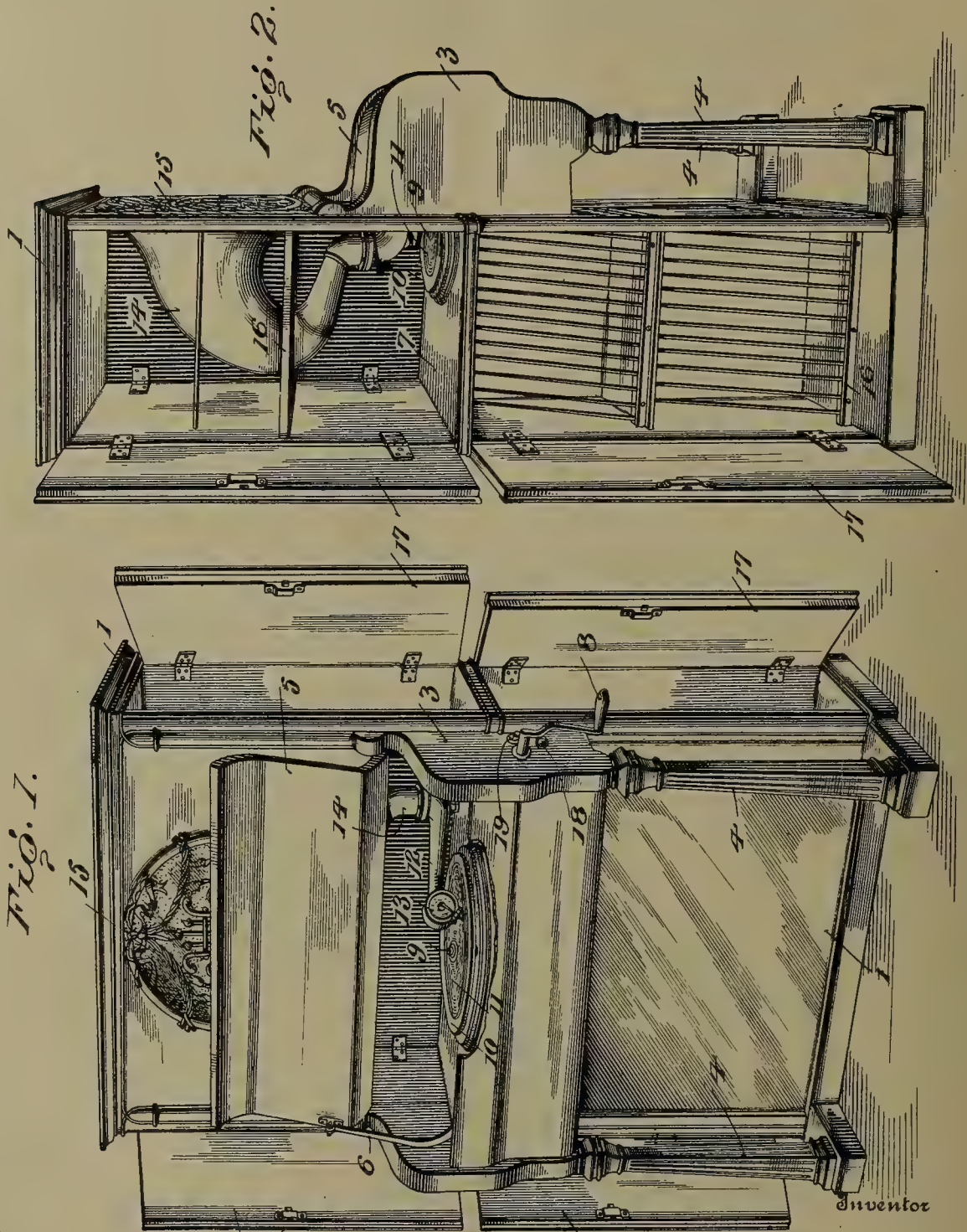
Witnesses:

MARY C. SMITH,
EDITH R. STILLEY.

W. L. ECKHARDT.
CABINET FOR TALKING MACHINES.
APPLICATION FILED JUNE 7, 1907.

903,364.

Patented Nov. 10, 1908.



Witnesses

August R. Thompson.
Ruth C. Fitzhugh.

By

Walter L. Eckhardt.
Mauro, Cameron, Lewis & Massie

Attorney

UNITED STATES PATENT OFFICE.

WALTER L. ECKHARDT, OF BROOKLYN, NEW YORK, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

CABINET FOR TALKING-MACHINES.

No. 903,364.

Specification of Letters Patent.

Patented Nov. 10, 1908.

Application filed June 7, 1907. Serial No. 377,801.

To all whom it may concern:

Be it known that I, WALTER L. ECKHARDT, a citizen of the United States, and a resident of Brooklyn, New York, have invented a new and useful Improvement in Cabinets for Talking-Machines, which improvement is fully set forth in the following specification.

The present invention relates to cabinets for talking-machines, and particularly those of the disk type.

The objects of the invention are to provide a cabinet which shall entirely inclose the machine and horn and at the same time leave the machine readily accessible for the purpose of placing records on the turntable thereof and removing them therefrom; to provide convenient compartments for the storing of records and other articles; and, generally, to present a cabinet which shall be a compact and attractive article of furniture.

The invention will be better understood by reference to the accompanying drawings, wherein—

Figure 1 is a perspective; and Fig. 2 is a side elevation.

Referring to the drawing, 1 is the casing proper the outward form of which is preferably that of an ordinary upright piano, with the usual extension or projecting portion 3 supported in part, if desired, by legs 4, which extension is provided with a lid 5 hinged or otherwise secured to the cabinet. This lid may be secured in its raised or elevated position by brace 6.

Extending horizontally across the cabinet is a partition 7 which divides both the casing proper and the extension into upper and lower compartments. The motor (not shown) for the talking machine is located, either partly or wholly, in the lower compartment of the extension where it is completely protected from dust and accident, with its winding shaft extending through an opening in one end wall of said extension where it is engaged by handle 8 when it is desired to crank the motor. Projecting upwardly through said partition is the usual driving shaft 9 for the turn-table 10 on which the sound-record 11 is mounted. A sound-conveying tube 12 has a reproducer 13 on one end thereof for engagement with the sound-record, and is connected at its other extremity by a universal joint to one

end of a horn 14. This horn is suitably shaped or bent to adapt it to the cabinet, with its mouth or delivery end opposite an opening 15 in the front face of the cabinet. Preferably this opening is in the form of ornamental open fretwork to enhance the attractiveness of the cabinet, with a sheet of silk or other thin material arranged thereover on the inside to exclude dust from the interior of the cabinet and horn. The horn may be supported or secured in the desired position in any suitable manner, the means herein shown being a supporting partition 16 provided with an opening within which the horn fits snugly. The flange of the horn at its mouth or delivery end may also be secured to the front wall of the cabinet.

In the lower part of the cabinet at either end thereof and beneath partition 7 is provided one or more series of racks 16 in which the disk sound-records are supported edgewise. Access is had to the compartments both above and below partition 7 through doors 17.

Normally when the machine is not in use, or when a selection is being rendered, doors 17 and lid 5 are closed, and when a selection is being rendered the sound issues through opening 15 in the front of the casing. When desired to replace the record by another, lid 5 is elevated and the turn-table being positioned well forward in the projecting portion 3, the record may be readily removed and replaced. The machine is started and stopped by actuating push buttons 18 and 19, respectively.

It will be appreciated that by the present invention a cabinet is presented which is a handsome and attractive article of furniture and of the same outward form as the ordinary upright piano; which completely incloses the talking-machine and its horn; and which affords convenient and compact means for the storing of sound-records and other accessories.

What is claimed is:

1. A talking-machine cabinet comprising a suitable box or casing with a laterally projecting portion, a motor in said projecting portion, a motor in said projecting portion below said partition, and a turntable, sound-conveying tube and horn above the same.

2. A talking-machine cabinet comprising a suitable box or casing with a laterally projecting portion, a horizontal partition extending through said casing and said projecting portion, a motor in said projecting portion below said partition, and a turntable, sound-conveying tube and horn above the same with the horn contained in said box or casing.
- 10 3. A talking-machine cabinet comprising a suitable box or casing with a laterally projecting portion and having an opening or openings through one wall, a talking-machine contained in said cabinet and having
- 15 its motor contained in said extension and its horn in said main box or casing with the delivery end of the horn juxtaposed to said opening or openings.
- 20 4. A talking-machine cabinet comprising a suitable box or casing with a laterally projecting portion, a horizontal partition extending through said casing and said projecting portion, racks for sound-records pro-

vided beneath said partition, and an opening or openings provided in the front face of the box or casing for the passage of the sound. 25

5. A talking-machine cabinet comprising a casing and a front section having a fall board, said casing and section having the outlines of an upright piano; a horizontal partition dividing said casing and section into compartments; an upper compartment containing a sound-conveying tube, a horn opening through one wall of said compartment, and a turn-table accessible through said front section; and a lower compartment comprising a main record chamber and a motor chamber in the front section. 30 35

In testimony whereof I have signed this specification in the presence of two subscribing witnesses. 40

WALTER L. ECKHARDT.

Witnesses:

R. L. SCOTT,

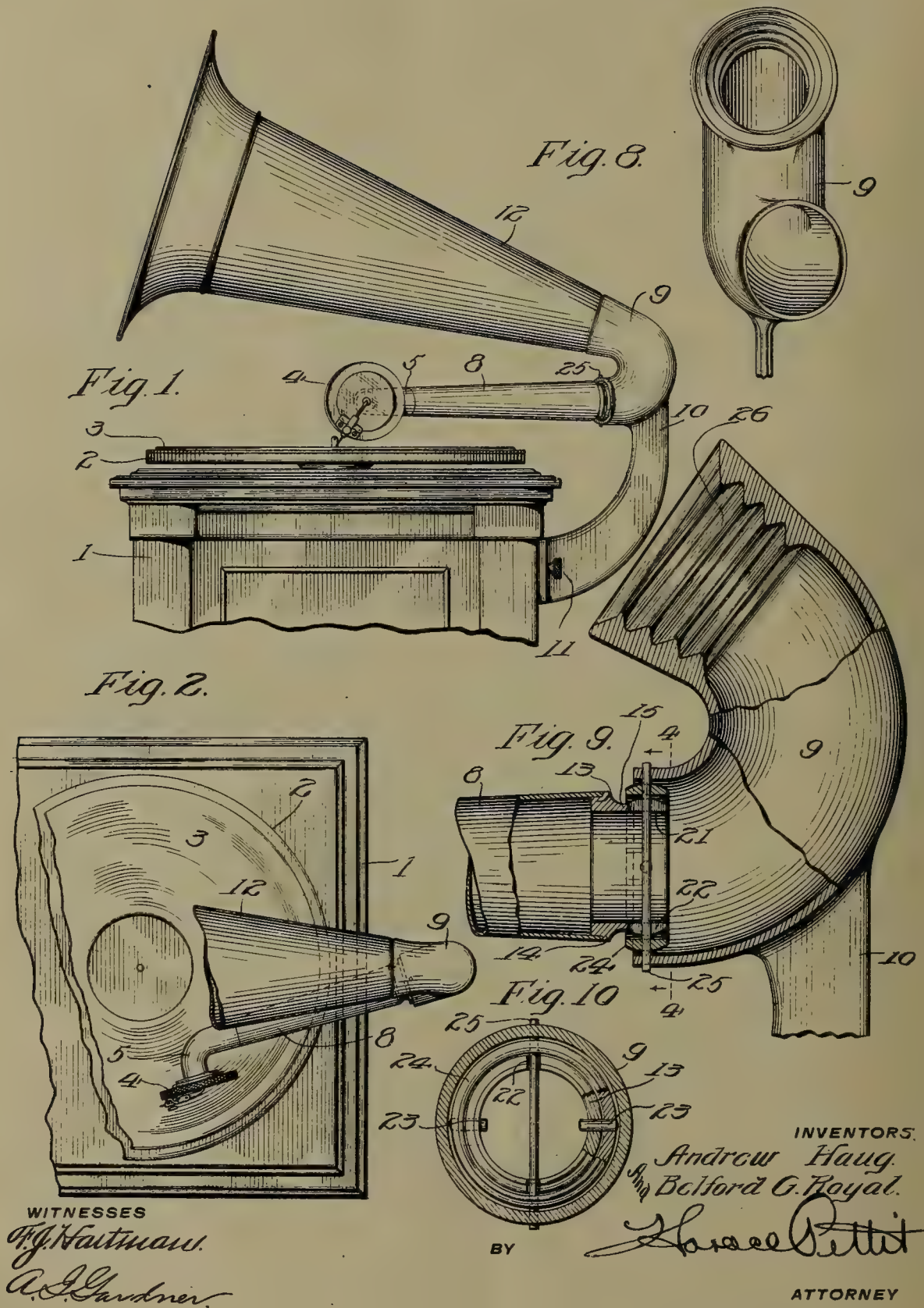
CLARENCE S. TAY.

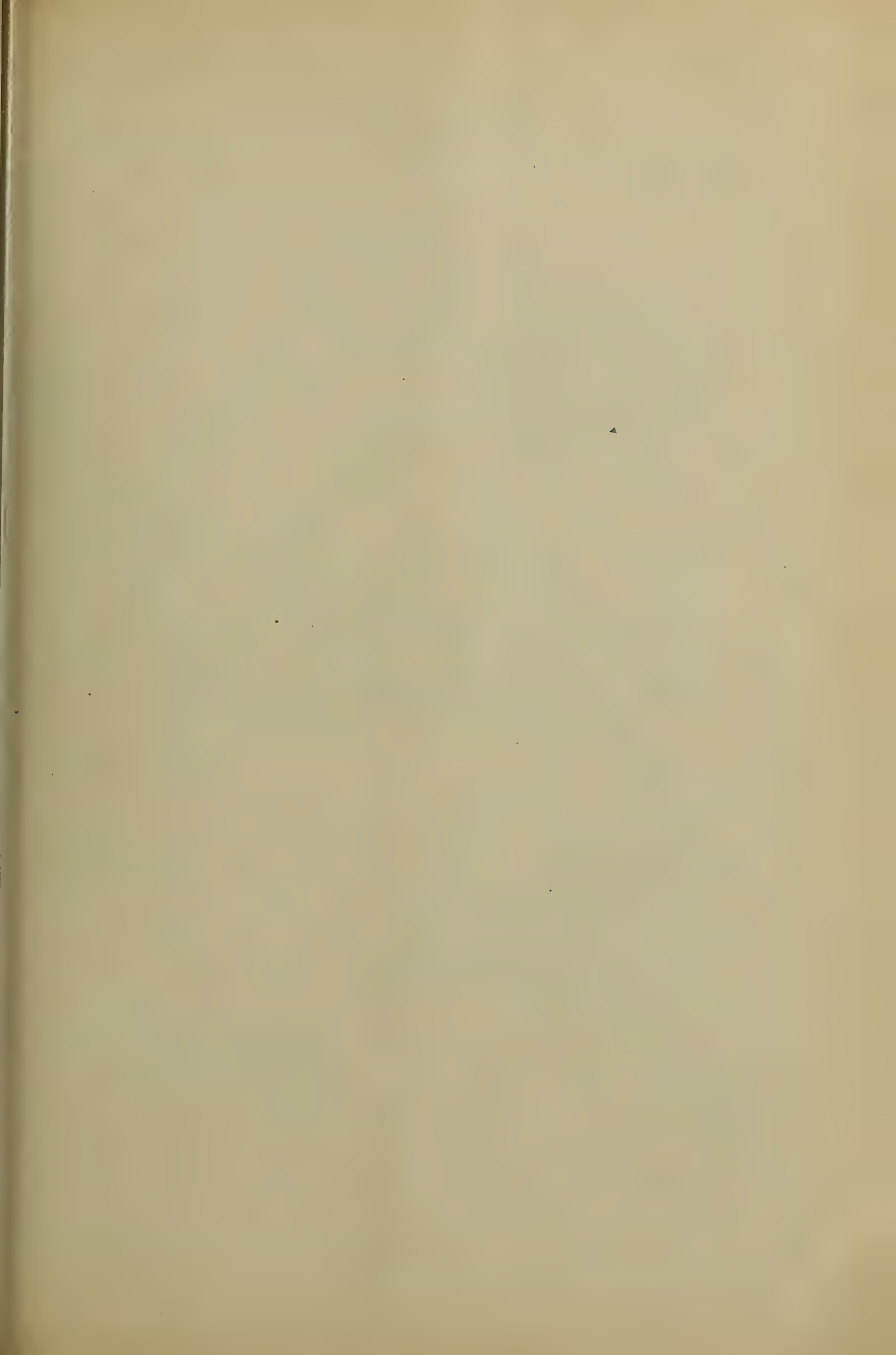
A. HAUG & B. G. ROYAL.
TALKING MACHINE.
APPLICATION FILED JUNE 11, 1907.

903,375.

Patented Nov. 10, 1908.

2 SHEETS—SHEET 1.



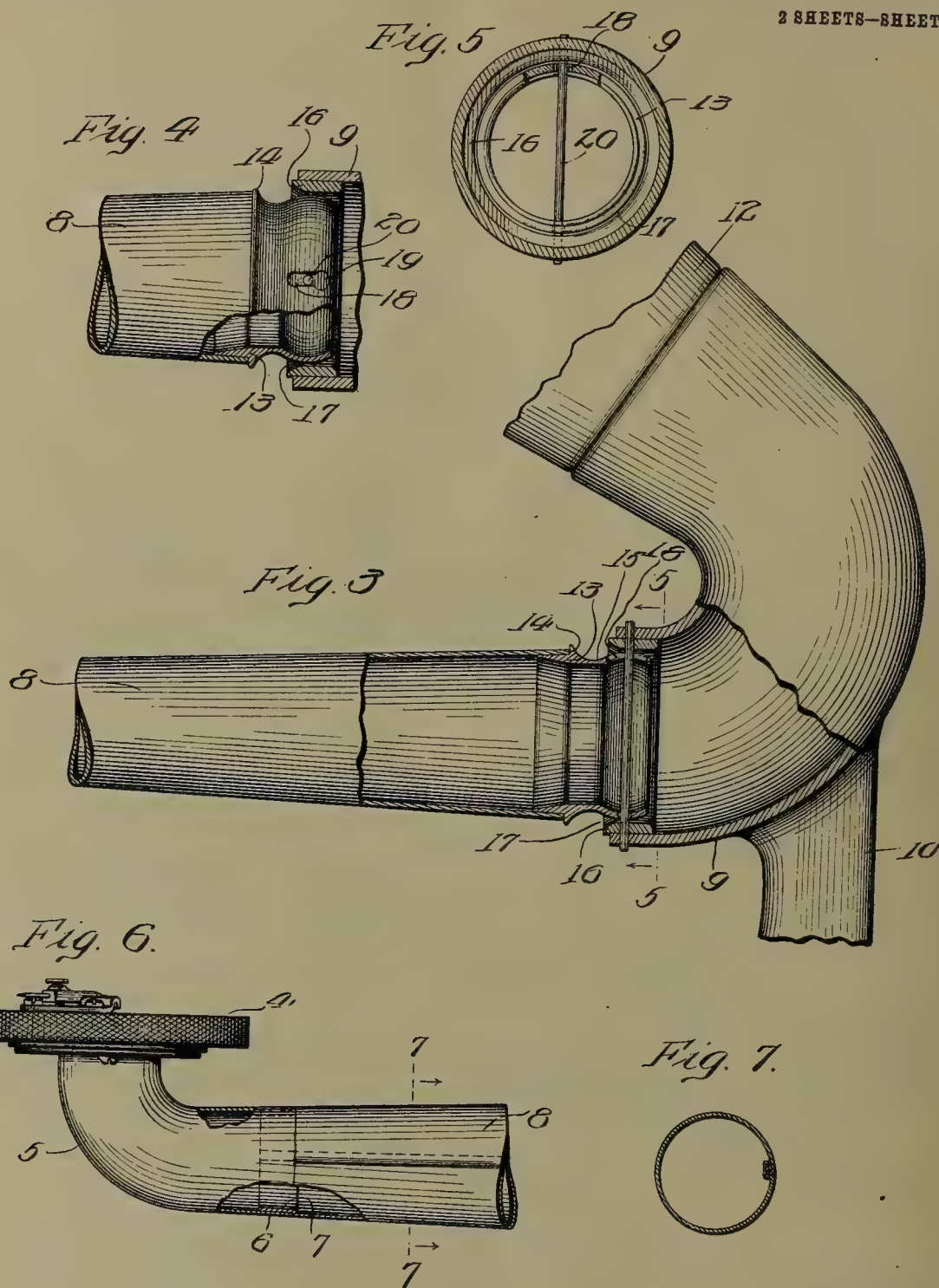


A. HAUG & B. G. ROYAL.
TALKING MACHINE.
APPLICATION FILED JUNE 11, 1907.

903,375.

Patented Nov. 10, 1908.

2 SHEETS—SHEET 2.



WITNESSES
H. J. Hartman.
A. J. Gardner.

INVENTORS
Andrew Haug.
Belford G. Royal.
BY Roscoe Pettit
ATTORNEY

UNITED STATES PATENT OFFICE.

ANDREW HAUG, OF CALDWELL, AND BELFORD G. ROYAL, OF CAMDEN, NEW JERSEY,
ASSIGNORS TO UNIVERSAL TALKING MACHINE MANUFACTURING COMPANY, A COR-
PORATION OF NEW YORK.

TALKING-MACHINE.

No. 903,375.

Specification of Letters Patent.

Patented Nov. 10, 1908.

Application filed June 11, 1907. Serial No. 378,332.

To all whom it may concern:

Be it known that we, ANDREW HAUG, a citizen of the United States, and a resident of Caldwell, county of Essex, State of New Jersey, and BELFORD G. ROYAL, a citizen of the United States, and a resident of Camden, county of Camden, State of New Jersey, have jointly invented certain new and useful Improvements in Talking-Machines, of which the following is a full, clear, and complete disclosure.

Our invention relates particularly to improvements in that class of talking machines in which the sound box communicates with the amplifying horn proper through an intermediate sound arm, the principal objects of this invention being to simplify the construction of the arm and of the means connecting the arm and the horn, to lessen the cost of manufacture without detracting from the practical utility of these parts.

With this and other objects in view, the invention consists in the novel construction, combination and arrangement of parts described in the following specification and more particularly pointed out in the appended claims.

In the accompanying drawings: Figure 1 is a side elevation of a talking machine constructed in accordance with this invention; Fig. 2 a fragmentary top plan view of the same; Fig. 3 a fragmentary side elevation partly in section of the joint between the arm and the horn; Fig. 4 a horizontal fragmentary section of the joint; Fig. 5 a vertical transverse section on line 5—5 of Fig. 3; Fig. 6 a bottom plan view showing how the sound box is attached to the taper arm; Fig. 7 a transverse vertical section on the line 7—7 of Fig. 6; Fig. 8 a front elevation in detail of the elbow and part of its supporting bracket; Fig. 9 a fragmentary side elevation partly in vertical section of a modified form of this invention; and Fig. 10 a transverse section on line 4—4 of Fig. 9.

The preferred form of this invention, as shown in Figs. 1 to 8 inclusive, comprises a cabinet 1, containing suitable mechanism for driving the turntable 2 mounted thereon, which supports the usual record 3.

The sound box 4 is secured to a tubular elbow 5, the outer end of which fits snugly over the reduced end 7 of the taper arm 8.

The upper end of the taper arm is supported within the inner end of the elbow 9 to swing in any direction, by means to be hereinafter described in detail. The said elbow 9 is preferably formed integrally with a bracket 10, which supports it from the side of the cabinet of the machine by means of screws 11, and the upper end of the elbow opens into the lower end of the amplifying horn 12, which is screw threaded into the elbow.

The means for supporting the taper arm within the elbow 9 comprises a head 13, fitting tightly within the end of the arm adjacent the elbow, and provided with a shoulder 14 resting against the edge of the arm, and a spherical end 15 extending loosely within a bushing 16, which fits tightly within the end of the said elbow. The said end 15 is rounded inwardly from the shoulder 14 to points adjacent the outer edge of the bushing, forming a neck and is then curved outwardly in a spherical shape within the said bushing, and the outer edge of said bushing is accordingly rounded, so as to permit of the necessary amount of motion of the arm, and at the same time to keep the space between the arm and the elbow substantially closed. The head 13 in the end of the arm is provided on the under side of its spherical portion with a circular aperture 17 and in the opposite upper part of the spherical portion with a longitudinal slot 18, which has broadened extremities 19 to admit of the free movement of the arm about the pin 20, which passes through the end of the elbow and its sleeve and through the said apertures. In order to obtain a free movement of the arm it is necessary to have the apertures in the under part of its bushing, somewhat larger than the pin which forms the pivotal support.

As it is necessary for the sound box to swing over but one side of the turntable, the lower end of the elbow 9, supporting the sound box arm, has been diverted from the line of the upper end of the elbow, and is extended in a line to one side of the center of the turntable, while the upper end of the elbow is radial with respect to the table, thus bringing the reproducing horn in a symmetrical position with respect to the machine, and at the same time bringing the lower end of the elbow to one side thereof, and permitting the requisite extent of lateral move-

ment of the swinging taper arm consistent with a close joint between said arm and elbow.

In the modification of this invention shown in Figs. 9 and 10, we have formed the joint between the arm and the elbow by means of a spherical head 21, similar to that already described, fitting tightly within the end of the taper arm, and provided with diametrically opposite longitudinal slots 22, as before, but supported upon horizontal pins or pivots 23 loosely within a ring 24, which has spherical inner and outer surfaces and is supported upon a vertical pin or pivot 25, extending through the elbow and ring and passing loosely through the slots of the inner bushing which supports the taper arm. This arrangement permits the arm to be swung horizontally upon the vertical pivot 25, carrying the ring with it, and at the same time it may be swung vertically upon its horizontal pivots within the ring. Fig. 9 also shows one method of attaching the lower end of the horn to the upper end of the elbow, by means of the screw threads 26, the lower end of the horn being accordingly screw threaded.

The taper arm may be made with or without a longitudinal seam, and the elbow 9 and the elbow 10 may be made in a single integral casting or in separate parts, as preferred, and other changes in the details of the construction may be made without departing from the spirit of this invention or the scope of its claims.

Having thus fully described our invention, what we claim and desire to protect by Letters Patent of the United States is:

1. In a talking machine, the combination with a sound box, of an arm supporting the same, an elbow supporting said arm and an amplifying horn carried by said elbow, one arm, of said elbow being vertically out of alinement with the other arm thereof.

2. In a talking machine, the combination with a sound box, of an arm supporting the same, the outer end of said arm being provided with oppositely disposed apertures, and a tubular elbow supporting said arm having a pin passing through said apertures, one arm of said elbow being vertically out of alinement with the other arm thereof.

3. In a talking machine, the combination with a sound box of an arm supporting the same, the outer end of said arm being provided with oppositely disposed apertures, and a tubular elbow supporting said arm having a pin passing through said apertures, one of said apertures being longer than the other, one arm of said elbow being vertically out of alinement with the other arm thereof.

4. In a talking machine, the combination with a sound box of an arm supporting the same, the outer end of said arm being provided with oppositely disposed apertures,

and a tubular support for said arm having a pin passing through said apertures, one of said apertures being longer than the other and being provided with enlarged ends.

5. In a talking machine, the combination with a sound box of an arm supporting said sound box, and provided with a spherical head having oppositely disposed apertures, one of said apertures being longer than the other and having enlarged ends, and a support for said head comprising an elbow and a cylindrical bushing fitting tightly therein and having a pin secured thereto extending through said apertures in said head.

6. In a talking machine, the combination with a sound box of an arm supporting said sound box, and provided with a spherical head having oppositely disposed apertures, one of said apertures being longer than the other, and a support for said head comprising a tubular connection, a bushing fitting tightly within one end of said connection, and a pin passing through said connection and bushing and through the said apertures in the head.

7. In a talking machine, the combination with a sound box, of an arm supporting the same, the outer end of said arm being provided with oppositely disposed apertures, and a tubular support for said arm having a pin passing through said apertures, one of said apertures being vertically above and longer than the other, and having an enlarged end.

8. In a talking machine, the combination with a sound box, of an arm supporting said sound box, and provided with a spherical head having oppositely disposed apertures, one of said apertures being longer than the other, said head having a shoulder resting against the edge of said arm, said shoulder being rounded inwardly to meet the spherical portion of the head, a cylindrical support for said head surrounding the same, the inner edge of said support being rounded to correspond to the curved surface of said shoulder, and a pin through said cylindrical support and said apertures in said head to retain the head in position.

9. In a talking machine, the combination with a sound box, of an arm supporting said sound box, and provided with a spherical head having oppositely disposed apertures, one of said apertures being vertically above and longer than the other, said head having a shoulder resting against the edge of said arm, said shoulder being rounded inwardly to meet the spherical portion of the head, a cylindrical support for said head surrounding the same, the inner edge of said support being rounded to correspond to the curved surface of said shoulder, and a pin through said cylindrical support and said apertures in said head to retain the head in position.

10. In a talking machine a swinging sound

arm, and a mounting therefor comprising a head, means pivoted to the under side of said head for swinging said arm laterally or vertically, means upon the upper side of said head for limiting the vertical motion of said arm, said arm being mounted to swing through a limited arc on an axis extending longitudinally of said arm through its point of support only when said arm is at one extremity of its vertical movement.

11. In a talking machine, the combination with an elbow of a sound conducting arm communicating with one arm of said elbow and a sound amplifier communicating with the other arm of said elbow, one arm of said elbow being vertically out of alinement with the other arm thereof.

12. In a talking machine the combination with a record turn-table of an elbow, a sound box arm supported by one arm of said elbow and limited to swing upon one side of the center of said table and a straight sound amplifier rigidly supported by the other arm of said elbow, substantially in perpendicular alinement with a diameter of said table.

13. In a talking machine the combination with a turn-table of an acute tubular elbow, a swinging sound arm supported by one arm of said elbow, and a straight amplifier supported by the other arm of said elbow, the arms of said elbow being perpendicularly out of alinement with respect to the plane of said turn-table.

14. In a talking machine, the combination with a turn-table of a fixed tubular elbow having one arm arranged with its axis substantially in an axial plane of said turn-table and having its other arm oblique to said plane, of a sound amplifier communicating with said first mentioned arm, and a swinging sound conveying arm supported by said oblique arm.

15. In a talking machine the combination with a swinging tubular member, of a member supporting the same, one of said members being provided with an elongated aperture having an enlarged portion and the other of said members being provided with a pin engaging in said aperture.

16. In a talking machine the combination with a tubular arm provided with a head, of a support for said head comprising a tubular member, a bushing fitting therein, and a pin passing through said tubular member, said bushing and said arm.

17. In a talking machine the combination with a tubular arm provided with a spherical head, having an inwardly curved neck, of a support for said head surrounding the same.

18. In a talking machine the combination with a tubular arm provided with a spherical head, having an inwardly curved neck, of a support for said head surrounding the same, said support having its inner edge rounded to conform to the curved surface of said neck.

19. In a talking machine, the combination with a tubular arm of a spherical head having a shoulder resting against the edge of said arm, said shoulder being rounded inwardly to meet the spherical portion of said head, and a support for said head surrounding the same.

20. In a talking machine, the combination with a tubular arm of a spherical head having a shoulder resting against the edge of said arm, said shoulder being rounded inwardly to meet the spherical portion of said head, and a support for said head surrounding the same, the inner edge of said support being rounded to correspond to the curved surface of said shoulder.

21. In a talking machine the combination of a hollow arm provided with oppositely disposed apertures, one of said apertures being elongated and provided with an enlarged portion, a pin passing through said apertures, and a support for said pin.

22. In a talking machine, the combination of two members, one of said members being pivoted upon one side to the other member, and being provided upon its opposite side with an elongated opening having an enlarged end, and the other of said members being provided with a projection extending into said opening.

23. In a talking machine the combination with an arm mounted to swing laterally or vertically, of means for limiting the vertical movement of said arm, said arm being mounted to swing through a limited arc about an axis extending longitudinally of said arm only when said arm is at one end of its vertical movement.

24. In a talking machine, the combination of two members, one of said members being rotatably connected upon one side to the other member, and being provided upon its opposite side with an elongated opening having an enlarged end, and the other of said members being provided with a projection extending into said opening.

25. In a talking machine, the combination with a sound box, of a tubular swinging arm supporting said box, and provided with a head, a support for said head comprising a tubular member, a bushing fitting therein, and a pin passing through said tubular member, said bushing and said arm.

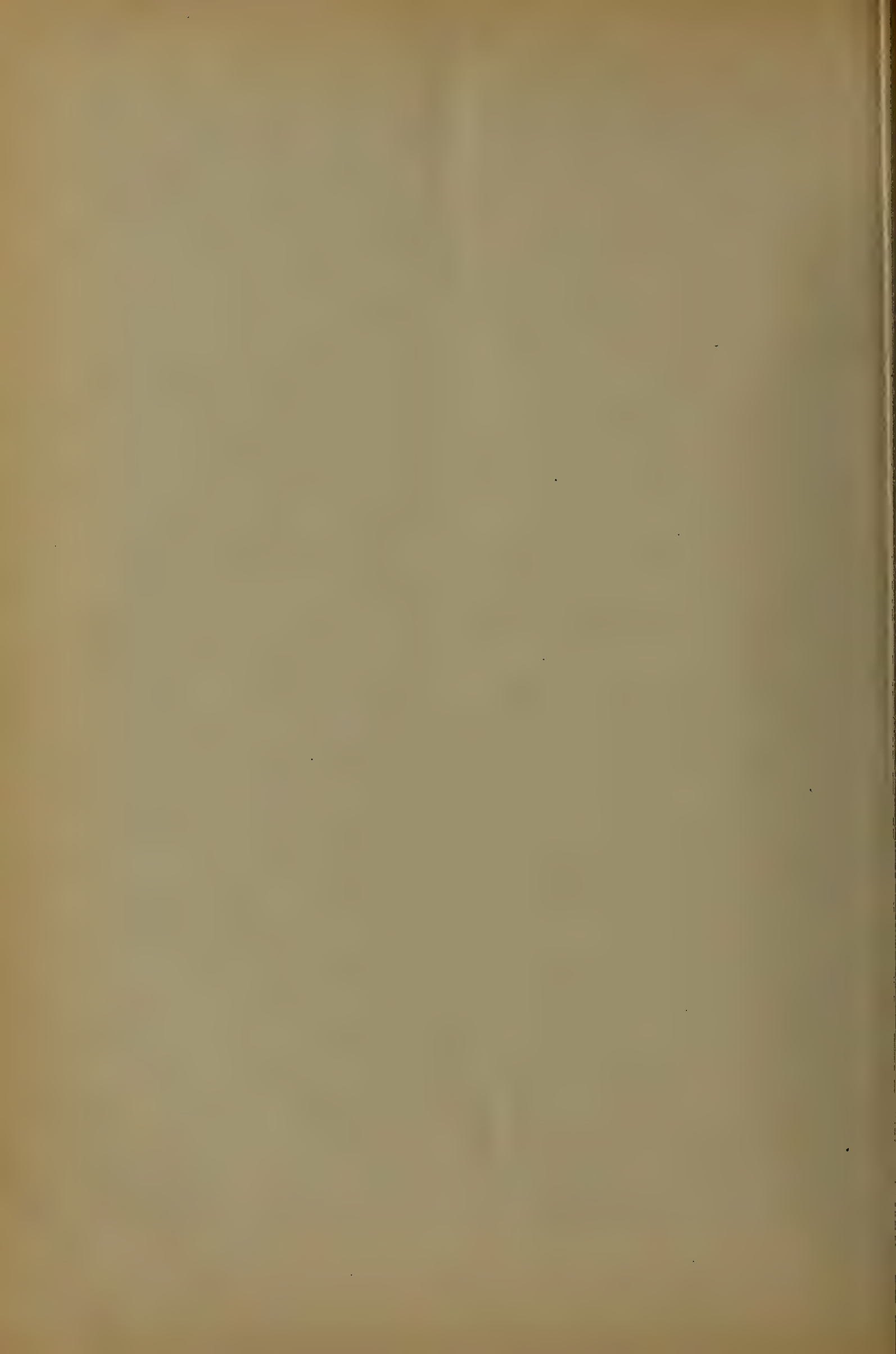
26. In a talking machine, the combination with a swinging tubular arm, of a sound box supported by one end thereof and a spherical head upon the other end of said arm having an inwardly curved neck, and a support for said head surrounding the same.

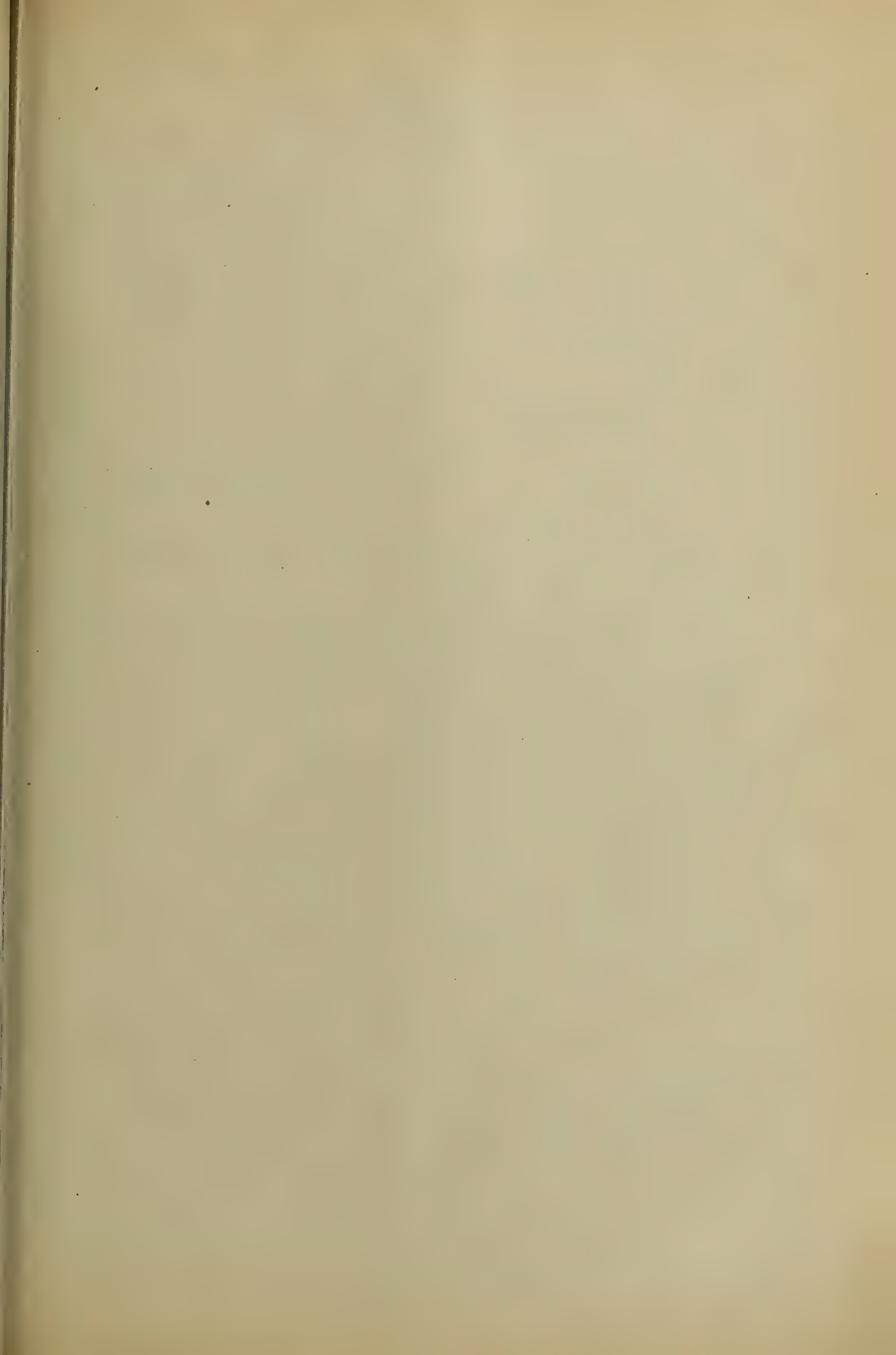
In witness whereof we have hereunto set our hands this 7th day of June 1907.

ANDREW HAUG.
BELFORD G. ROYAL.

Witnesses:

ANNA LIPSHITZ,
H. L. DE RICHEMOND.





C. C. JADWIN.
HORN FOR REPRODUCING NATURAL TONES.
APPLICATION FILED JUNE 20, 1908

903,575.

Patented Nov. 10, 1908.

Fig. 2.

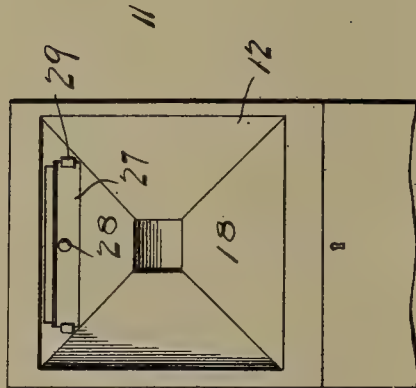


Fig. 3.

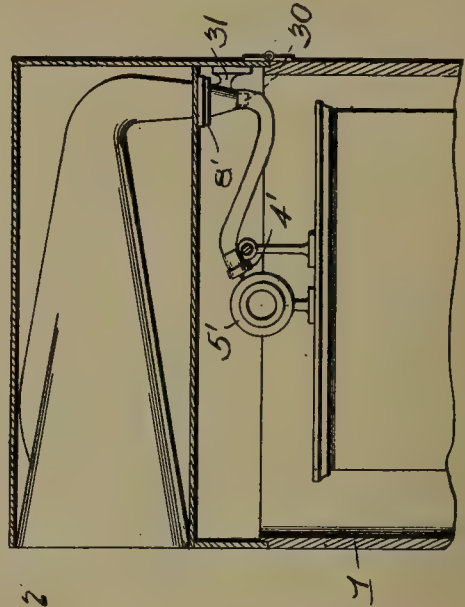
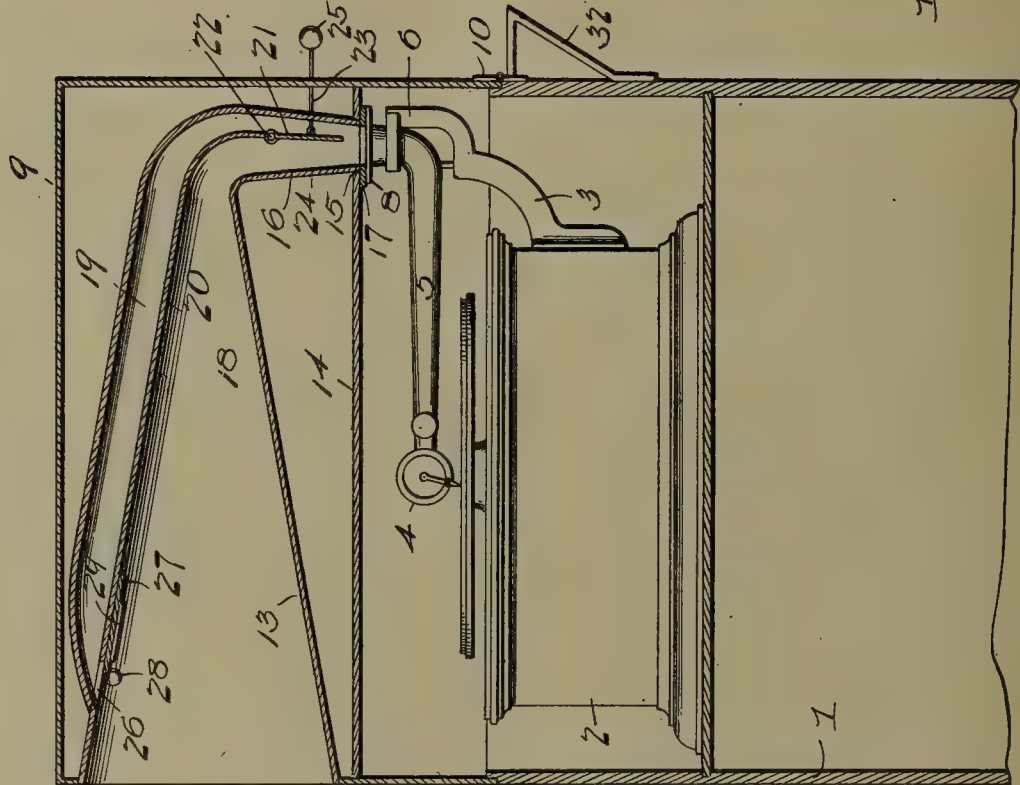


Fig. 1.



Witnesses

D. H. Hochstetler
E. B. Crocker

Inventor

Cornelius C. Jadwin

By

Rexford M. Smith

Attorney

UNITED STATES PATENT OFFICE.

CORNELIUS C. JADWIN, OF HONESDALE, PENNSYLVANIA.

HORN FOR REPRODUCING NATURAL TONES.

No. 903,575.

Specification of Letters Patent.

Patented Nov. 10, 1908.

Application filed June 20, 1908. Serial No. 439,574.

To all whom it may concern:

Be it known that I, CORNELIUS C. JADWIN, a citizen of the United States, residing at Honesdale, in the county of Wayne and State of Pennsylvania, have invented a certain new and useful Horn for Reproducing Natural Tones, of which the following is a specification, reference being had therein to the accompanying drawing.

10 This invention relates to horns for reproducing natural tones the main object of the invention being to provide an article of the class described which is applicable to any of the sound reproducing machines now in com-
15 mon use and adapted to be hinged to the cabinets containing the instrument to enable the records to be removed and replaced on the instrument and the necessary adjustments to be effected.

20 A further object of the invention is to provide a horn which embodies a plurality of sound passages combined with a common throat, and means for varying the volume of sound waves transmitted to the respective
25 passages to vary the tones finally produced by the horn.

With the above and other objects in view, the nature of which will more fully appear as the description proceeds, the invention
30 consists in the novel construction, combination and arrangement of parts as herein fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a vertical sectional view of a sound reproducing cabinet, showing a machine mounted
35 therein and illustrating the improved horn also shown in longitudinal section. Fig. 2 is a front elevation of the cabinet section containing the horn. Fig. 3 is a reduced
40 vertical section showing the horn applied to another type of instrument.

Referring to the drawings, 1 designates the main body or section of a cabinet in the upper portion of which is mounted a sound
45 reproducing instrument 2, the instrument illustrated in Fig. 1 being of the type known as a graphophone and embodying an arm supporting bracket 3 a reproducer 4 and a sound-transmitting conduit 5 leading off
50 from the reproducer.

In order to carry out the present invention, the conduit 5 is supported by the bracket 3 or an extension 6 thereof and is provided with an upturned portion 7 having
55 a circumferential flange 8, the purpose of which will appear.

Mounted on the main section 1 of the cabinet is a superimposed section 9 the same being hinged at 10 to the main section so that it may be thrown back to give access to
60 the instrument contained in the main section in order to permit the records to be changed and the other necessary adjustments to be effected. The cabinet section 9 is closed on all sides except at the front which is par-
65 tially closed as shown at 11, the opening 12 in the front being commensurate in size with the mouth of the horn, illustrated at 13. The section 9 comprises in addition to a top wall, a bottom wall 14 which is provided with an
70 opening 15 which receives the lower end of the down-turned throat 16 of the horn. This throat extends substantially in a vertical plane while the main body of the horn extends in a substantially horizontal plane as
75 clearly shown in Fig. 1 and in order to effect a tight joint between the throat 16 and the upstanding portion 7 of the conduit 5, a gasket or packing washer 17 of some soft flexible material such as felt, leather or rub-
80 ber is interposed between the flange 8 and the bottom 14 of the superimposed cabinet section, the part 17 being preferably secured to and carried by the cabinet section 9.

The horn embodies a plurality of sound
85 passages, 18 designating the main passage and 19 an auxiliary passage which follows the general direction of the main passage as shown in Fig. 1 but is of relatively smaller capacity, being divided off from the main
90 passage by an intervening wall or partition 20 which also divides the throat 16 into a corresponding number of passages.

21 designates a divider or pallet which is jointed at its upper end as shown at 22 to
95 the corresponding extremity of the wall or partition 20 as clearly shown in Fig. 1, adapting the lower free end of said divider to be moved back and forth across the throat 16, this being accomplished by means of a
100 suitable handle which is shown as embodying a stem or rod 23 jointed to the divider at 24 and preferably having a knob or button 25, the construction described enabling the divider or pallet to be moved or adjusted
105 for the purpose of varying the relative volume of sound passing to the respective passages 18 and 19.

26 designates an opening or port leading from the discharge end of the auxiliary pas-
110 sage 19 into the main passage 18 for again commingling the sound waves previously

separated by the divider or pallet 21. The opening 26 is controlled as to size by means of a damper 27 having a suitable operating knob or projection 28 and mounted to slide in suitable guides 29 whereby it may be manually moved across the opening 26 to vary the size of the opening to suit the nature or character of the sounds coming from the reproducing instrument.

Where the invention is to be used in connection with an Edison phonograph as shown in Fig. 3, the traveling reproducer 4' may have the flexible sound conduit 5' connected at one end to a nozzle 30 supported by a bracket 31 connected to one wall of the main cabinet section 1 as shown in Fig. 3, which nozzle will be provided with a flange 8' forming a seat for the gasket or packing washer 17 above described.

32 designates a stop or rest for supporting the hinged section of the cabinet when thrown back to give access to the instrument.

By means of the construction above described, the volume of sound transmitted through the horn is divided or split up after the manner of the ordinary human head, the part 16 corresponding with the throat, the part 21 representing the pallet, the passage 18 corresponding with the mouth and the auxiliary passage 19 corresponding with the nasal passage. As a result the tones are nicely blended and the disagreeable scratching noise so common to instruments of this kind is to a very large extent overcome, while metallic sounds are entirely overcome. The horn may be used in connection with the inclosing cabinet section, without the main lower section, or said horn may be used independently of both cabinet sections.

I claim:—

1. A horn for the purpose specified comprising a throat, main and auxiliary sound

passages leading therefrom, and means for varying the relative capacities of said passages.

2. A horn for the purpose specified comprising main and auxiliary passages, a throat common to both passages, and means for varying the relative area of communication between said passages and throat.

3. A horn for the purpose specified comprising main and auxiliary passages, a throat common to both passages, and a movable divider for regulating the volume of sound waves delivered to the respective passages.

4. A horn for the purpose specified comprising main and auxiliary passages, a throat common to both passages, a divider for regulating the volume of sound waves delivered to the respective passages, and means for adjusting said divider.

5. A horn for the purpose specified comprising main and auxiliary passages, a throat common to both passages, an adjustable divider for regulating the volume of sound waves delivered to the respective passages, and a damper controlling the communication between said passages where they reunite.

6. A horn for the purpose specified comprising a cabinet section, a throat, main and auxiliary sound passages leading from said throat, means for varying the relative area of communication between said passages and throat, and means on the horn for effecting a closed joint between said throat and the sound-transmitting conduit of a reproducing instrument.

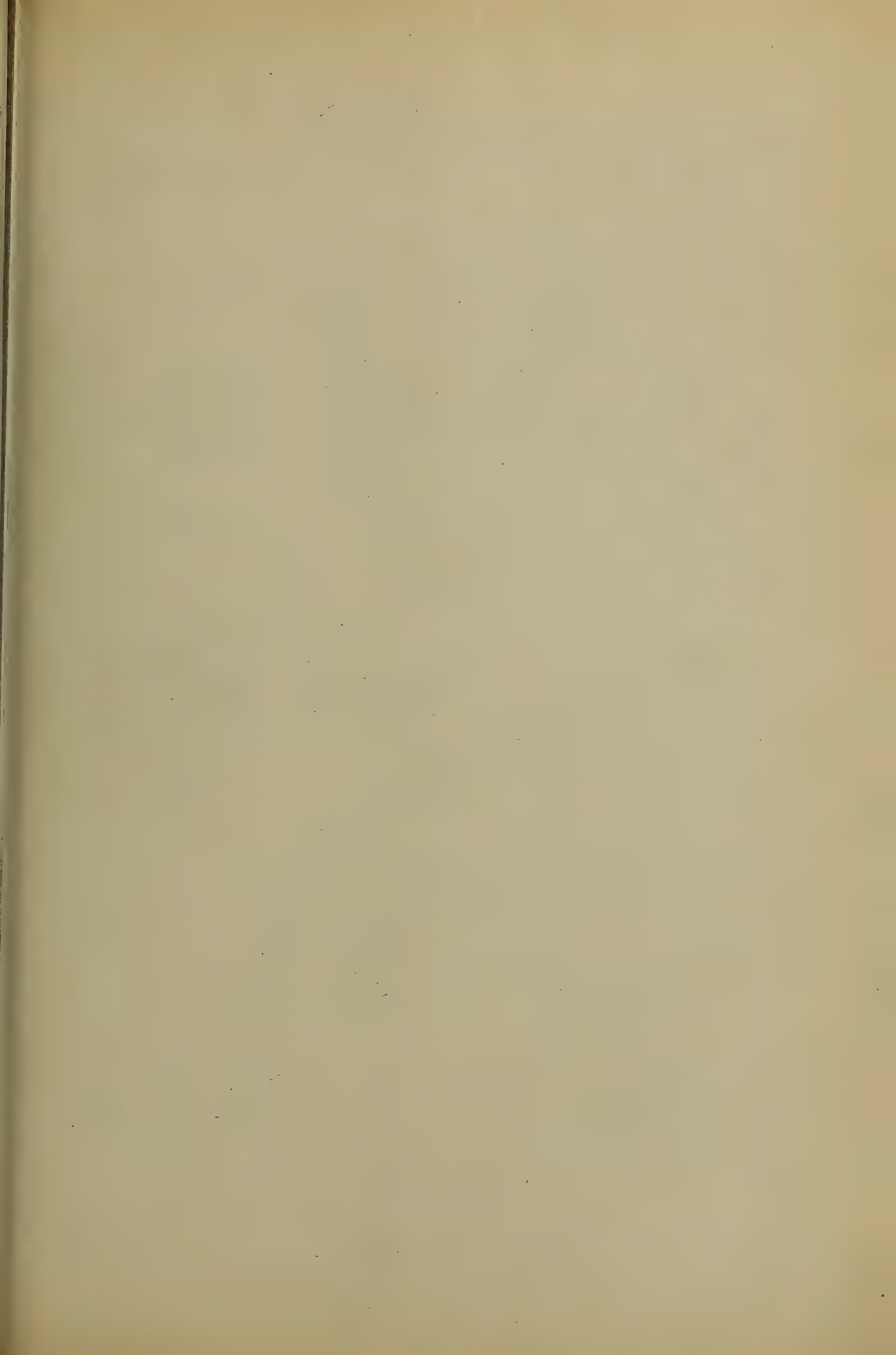
In testimony whereof I affix my signature in presence of two witnesses.

CORNELIUS C. JADWIN.

Witnesses:

GEO. P. ROSS,

EARL SHERWOOD.



W. W. YOUNG.
DIAPHRAGM FOR TALKING MACHINES.
APPLICATION FILED JAN. 16, 1907.

904,110.

Patented Nov. 17, 1908.

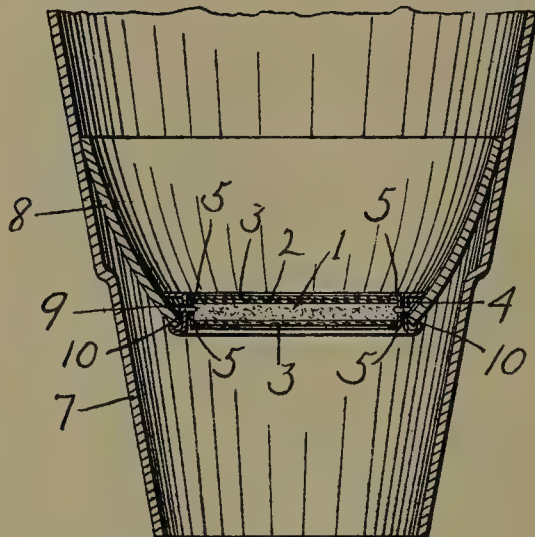


FIG. 1.

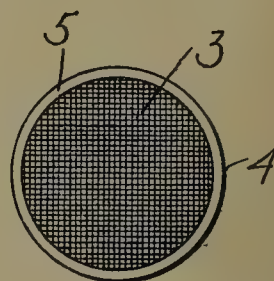


FIG. 2.

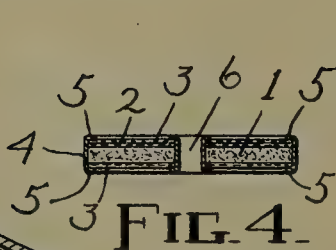


FIG. 4.

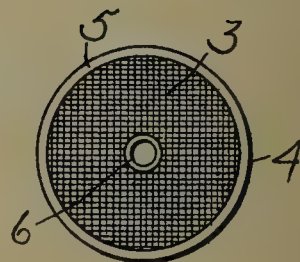


FIG. 5.

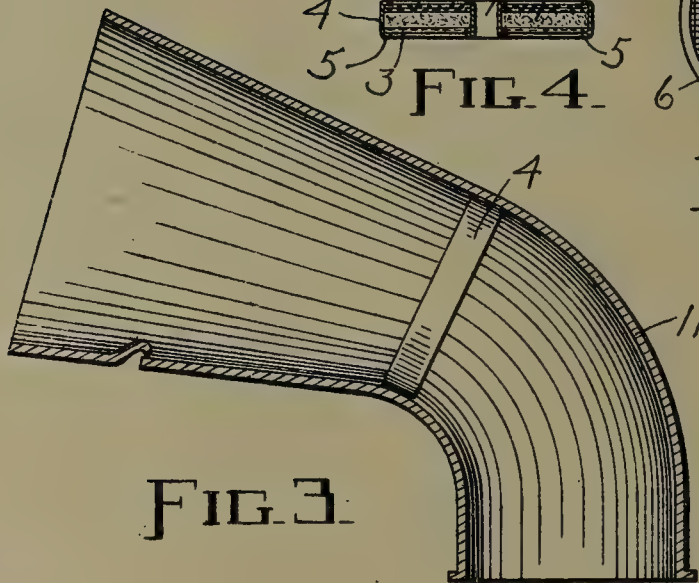


FIG. 3.

WITNESSES

P. H. Martin
J. M. Sterne

INVENTOR

William W. Young,
BY *Webster & Co.,*
ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM W. YOUNG, OF SPRINGFIELD, MASSACHUSETTS.

DIAPHRAGM FOR TALKING-MACHINES.

No. 904,110.

Specification of Letters Patent.

Patented Nov. 17, 1908.

Application filed January 16, 1907. Serial No. 352,527.

To all whom it may concern:

Be it known that I, WILLIAM W. YOUNG, a citizen of the United States of America, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented a new and useful Diaphragm for Talking-Machines, of which the following is a specification.

My invention relates to improvements in sound reproducing and modifying devices designed to be employed with phonographs and other so-called talking-machines, and consists essentially of a disk of comparatively thick fabric and means to support the same in the horn or other sound conduit of a machine, together with such other features as it may be deemed expedient to associate therewith, all as hereinafter set forth. For this purpose a felt disk has been found to give as good if not better results than disks of other materials, such disk being supported in a flanged ring or collar with a wire-gauze disk on one or both sides. The wire-gauze disk or disks not only serve to support the fabric disk in the collar, but also advantageously modify the tone to some considerable extent, as well as the last-mentioned disk. Other disks, preferably of stiff gauze fabric as horsehair, may be added, if desired, with the same end in view.

The object of my invention is to provide, in a convenient form for use in connection with talking-machines, a diaphragm which will soften and mellow the sounds produced by such machines. This device breaks up the sound waves which pass through it, takes out the metallic ring and the rumbling and rasping sound often present, and transforms the vibrations into clear and distinct tones. I attain this object by the means illustrated in the accompanying drawings, in which—

Figure 1 is a cross-section of the diaphragm, showing the same supported in the horn of a talking-machine; Fig. 2, a side view of said diaphragm; Fig. 3, an edge view of the diaphragm as it appears in the goose-neck of a machine; Fig. 4, a cross-section of a slightly modified form of the device, and, Fig. 5, a side view of the latter.

Similar figures refer to similar parts throughout the several views.

The device shown in the drawings is made up of a thick fabric or felt disk 1, a gauze fabric or horsehair disk 2, two outer wire-gauze disks 3, and a ring or collar 4 provided with inturned flanges 5—5 on both sides and

capable of holding the several disks compactly together and thus making a neat and convenient diaphragmal member out of the different parts when considered as a whole. The aforesaid disks may be perforated and fastened together with an eyelet 6, as shown in the last two views. The flanged collar 4 and the wire-gauze disks 3 really constitute a casing or case for the other disks if both be used, or for the disk 1 when that is used alone. The disks 3 have the required amount of strength or firmness to form the sides of the case, and at the same time they not only permit the sound waves to pass through them, but improve the tone of the same.

As already stated the disk 2 may be omitted, but when used this disk like the others serves to mellow and improve the tone of the instrument with which the diaphragm is connected. It is immaterial upon which side of the diaphragm the disk 2 is placed; furthermore, such disks may be employed on both sides if desired. The disk 1 is the most important one since it is that which produces the greatest effect on sound and will improve it to a very great extent in the absence of other mediums for a like purpose.

When the eyelet 6 is employed some of the volume of sound emanating from the machine is enabled to pass through the diaphragm without being modified to the same extent as that which passes through the surrounding parts of said diaphragm, or in any event the modification is different in kind and degree, and the resulting tone is in many cases as desirable as the tone produced by the diaphragm which has no eyelet therein. The eyelet brings about different results, too, for the reason that it binds the several disks together within the field of their actual operation, that is, inside of the flanges 5, and so changes their rate of vibration and the rate of vibration of the volume of sound passing through the diaphragm. This eyelet may be placed in the center of the diaphragm, as shown, or at one side of the center, and more than one may be provided in a single diaphragm. The eyelet might be used with a diaphragm made up of fewer parts than are shown; then again the eyelet might be omitted from the opening which is adapted to receive it and the disk or disks having such opening therein employed without it.

The diaphragm is placed in any convenient and suitable manner in the horn, the

goose-neck, or other tubular part of a talking-machine. A portion of a horn is represented at 7, in Fig. 1, with the diaphragm supported therein by means of a holder 8 provided with a collar 9 to which the collar 4 is pivoted at 10—10. This arrangement enables the diaphragm to be opened by turning it on the pins 10, for the purpose of increasing the volume of tone.

10 The means of supporting the diaphragm in this case is not herein claimed for the reason that it forms the subject matter of an application for United States Letters Patent filed by me January 9th, 1907, and serially
15 numbered 351,419.

In Fig. 3 a goose-neck 11 appears with the diaphragm located therein at the upper end of the elbow.

The omission of one of the wire-gauze
20 disks 3 would not render the device inoperative or unserviceable, and the same is true of the omission of both of such disks, nevertheless, the presence of both of these disks is greatly to be preferred for the reason that
25 the value of the diaphragm is then very much enhanced on account of the better results obtained therewith, and also from a commercial standpoint owing to the increased durability and improved appearance.

30 What I claim as my invention, and desire to secure by Letters Patent, is—

1. As a new article of manufacture, a diaphragm, comprising a fabric disk of substantial thickness, and a confining collar provided with inturned flanges on both sides for the edges of such disk, such collar with its disk being adapted to be inserted in and removed from a tubular part of a sound-producing or -reproducing instrument or machine.
40

2. As a new article of manufacture, a diaphragm, for talking-machines, comprising a fabric disk, a gauze disk, and a confining collar provided with inturned flanges on
45 both sides for the edges of such disks, said collar and gauze disk forming a case for the fabric disk.

3. As a new article of manufacture, a diaphragm, comprising a perforated fabric disk
50 of substantial thickness, and a confining collar provided with inturned flanges on both sides for the edges of such disk, said collar and its disk being adapted to be inserted in

and removed from a tubular part of a sound-producing or -reproducing instrument or machine. 55

4. As a new article of manufacture, a diaphragm, for talking machines, comprising a fabric disk, a gauze disk, and a confining collar provided with inturned flanges on
60 both sides for the edges of such disks, said disks having alining openings therethrough, and said collar and gauze disk forming a case for the fabric disk.

5. As a new article of manufacture, a diaphragm, comprising a perforated fabric disk of substantial thickness, an eyelet in the perforation in such disk, and a confining collar for the edges of the disk, said collar with its disk being adapted to be inserted in and removed from a tubular part of a sound-producing or -reproducing instrument or machine. 70

6. As a new article of manufacture, a diaphragm for talking-machines, comprising a fabric disk, a gauze disk, said disks having alining openings therethrough, an eyelet in such openings, and a confining collar for the edges of the disks, said collar and gauze disk forming a case for the fabric disk. 80

7. The combination, in a diaphragm for talking-machines, of a case consisting of a flanged collar and gauze disk sides and a fabric disk within such case.

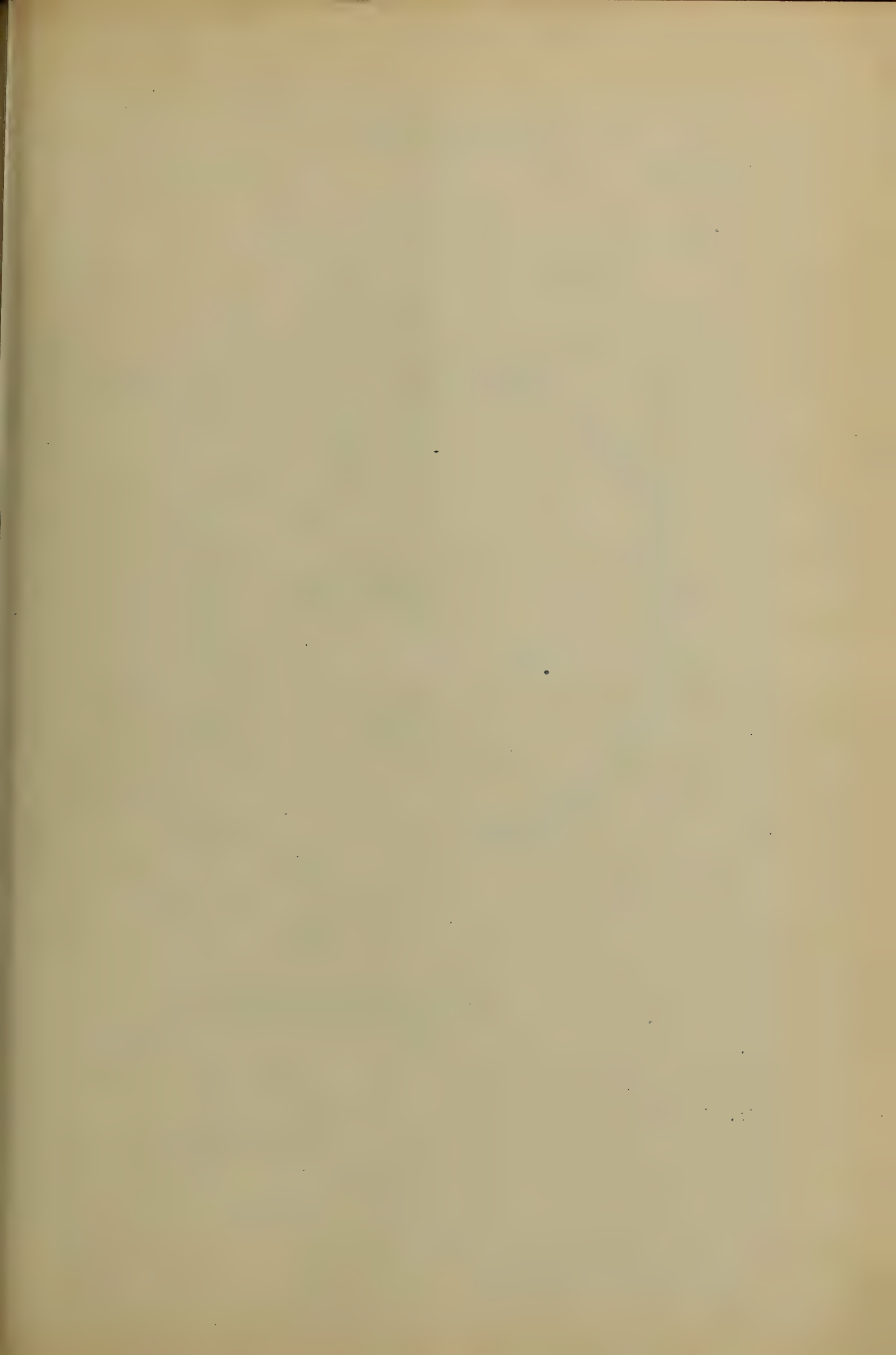
8. As a new article of manufacture, a diaphragm, for talking-machines, comprising a fabric disk, gauze disks both sides of said fabric disk, all of the disks having alining openings therethrough, and a flanged collar adapted to receive the disks and to confine them at the edges, said collar and gauze disks forming a case for the fabric disk. 90

9. As a new article of manufacture, a diaphragm, for talking-machines, comprising a fabric disk, gauze disks both sides of said fabric disk, all of the disks having alining openings therethrough, an eyelet in such openings, and a flanged collar adapted to receive the disks and to confine them at the edges, said collar and gauze disks forming a case for the fabric disk. 100

WILLIAM W. YOUNG.

Witnesses:

P. H. MARTIN,
F. A. CUTTER.



J. EIFEL.

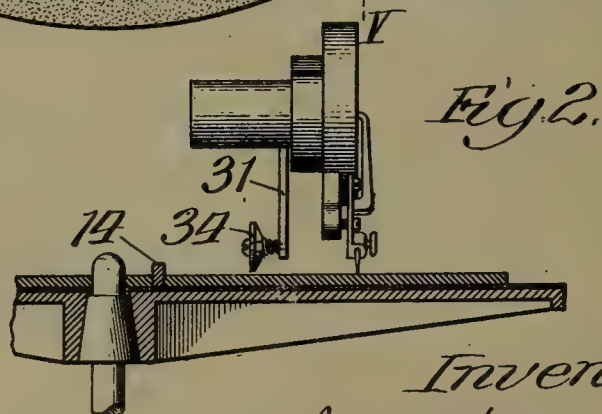
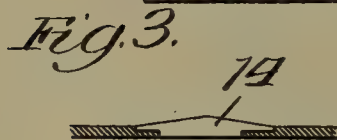
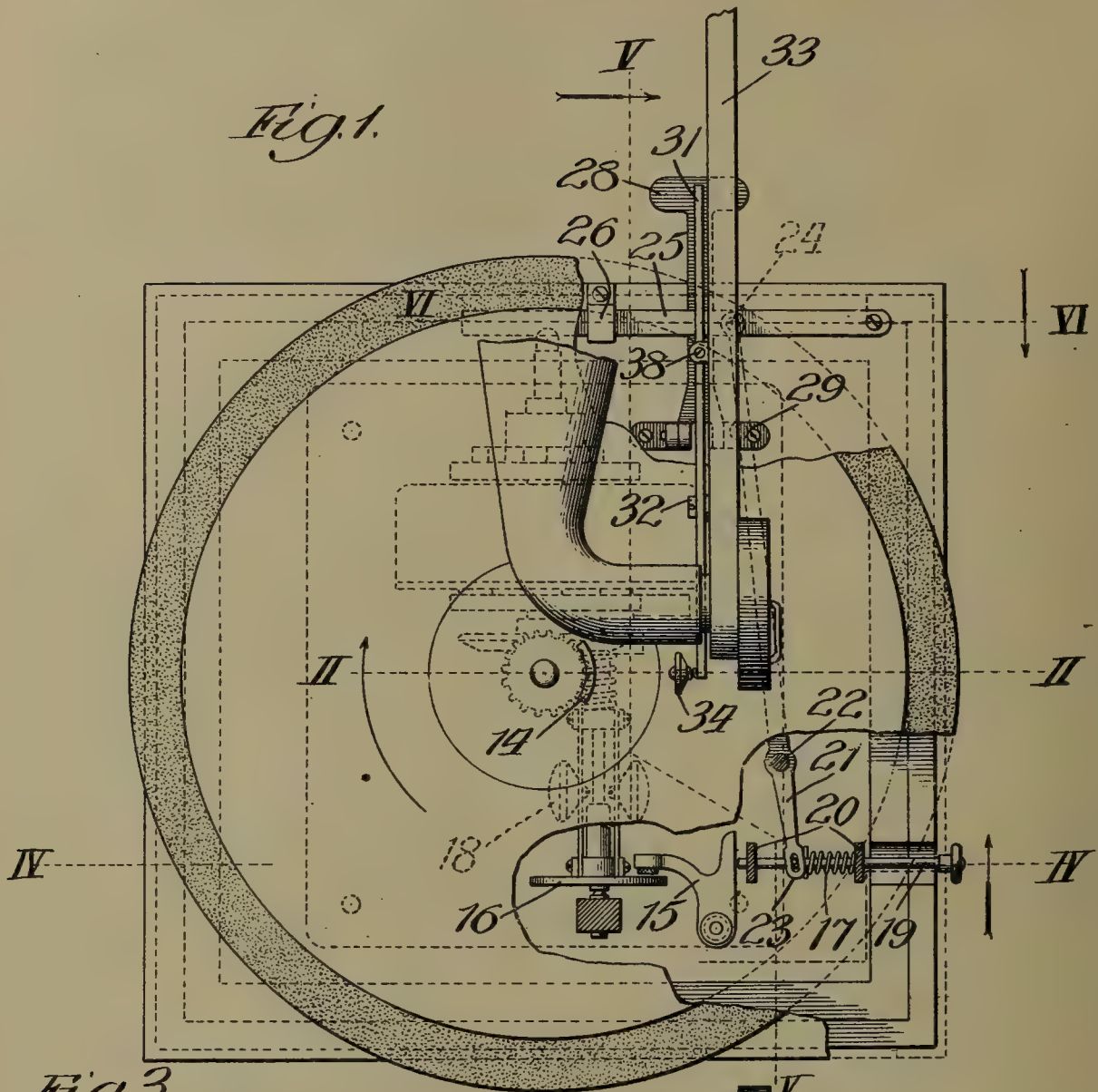
AUTOMATIC OUT-OFF FOR SOUND REPRODUCING MACHINES.

APPLICATION FILED APR. 1, 1907.

904,187.

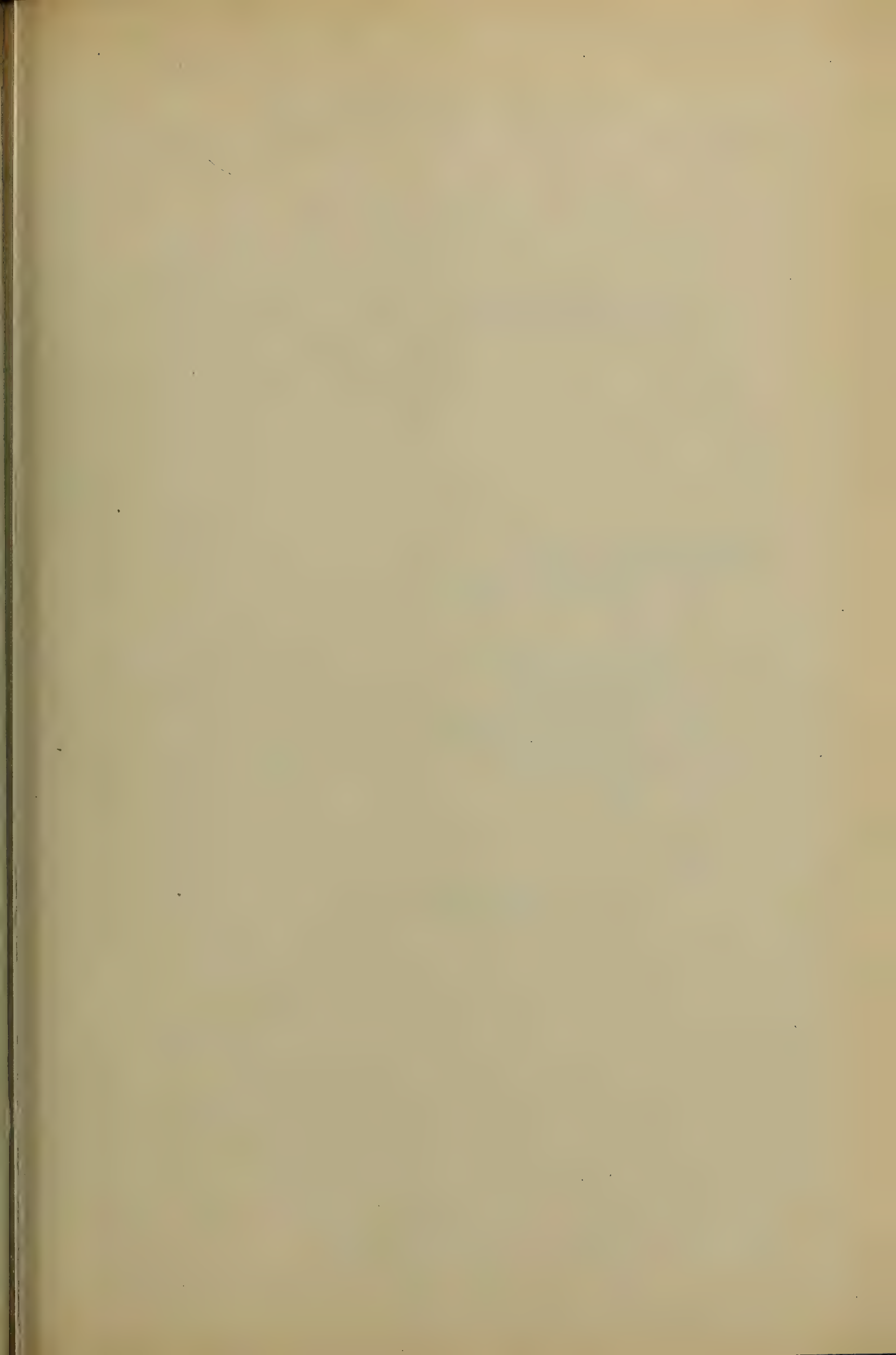
Patented Nov. 17, 1908.

4 SHEETS—SHEET 1.



Witnesses:
A. E. Gaither.
Jas N Lorenz

Inventor:
Joseph Eifel
by attys
Symmes & Carpenter



904,187.

Patented Nov. 17, 1908.
 4 SHEETS—SHEET 2.

Fig. 4.

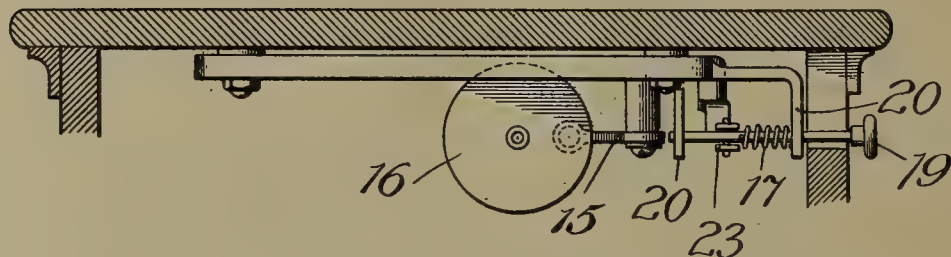


Fig. 5.

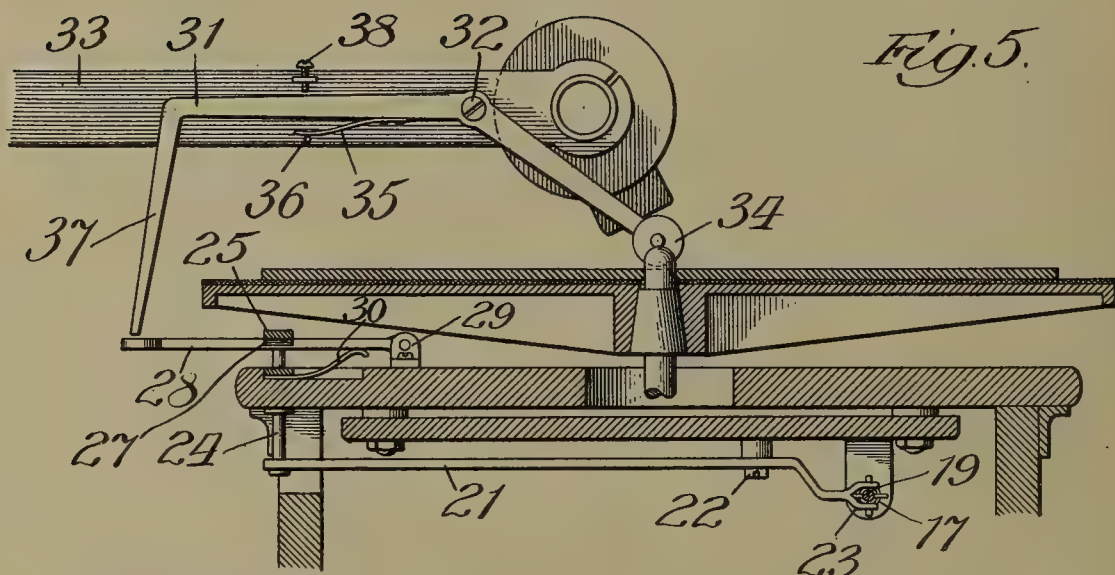
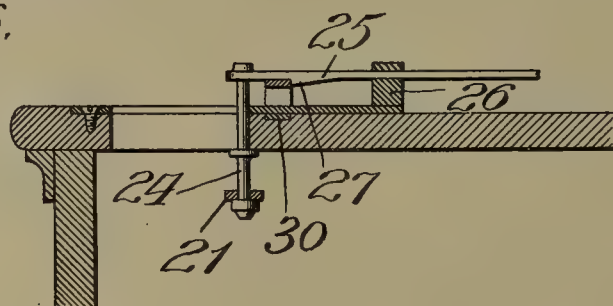
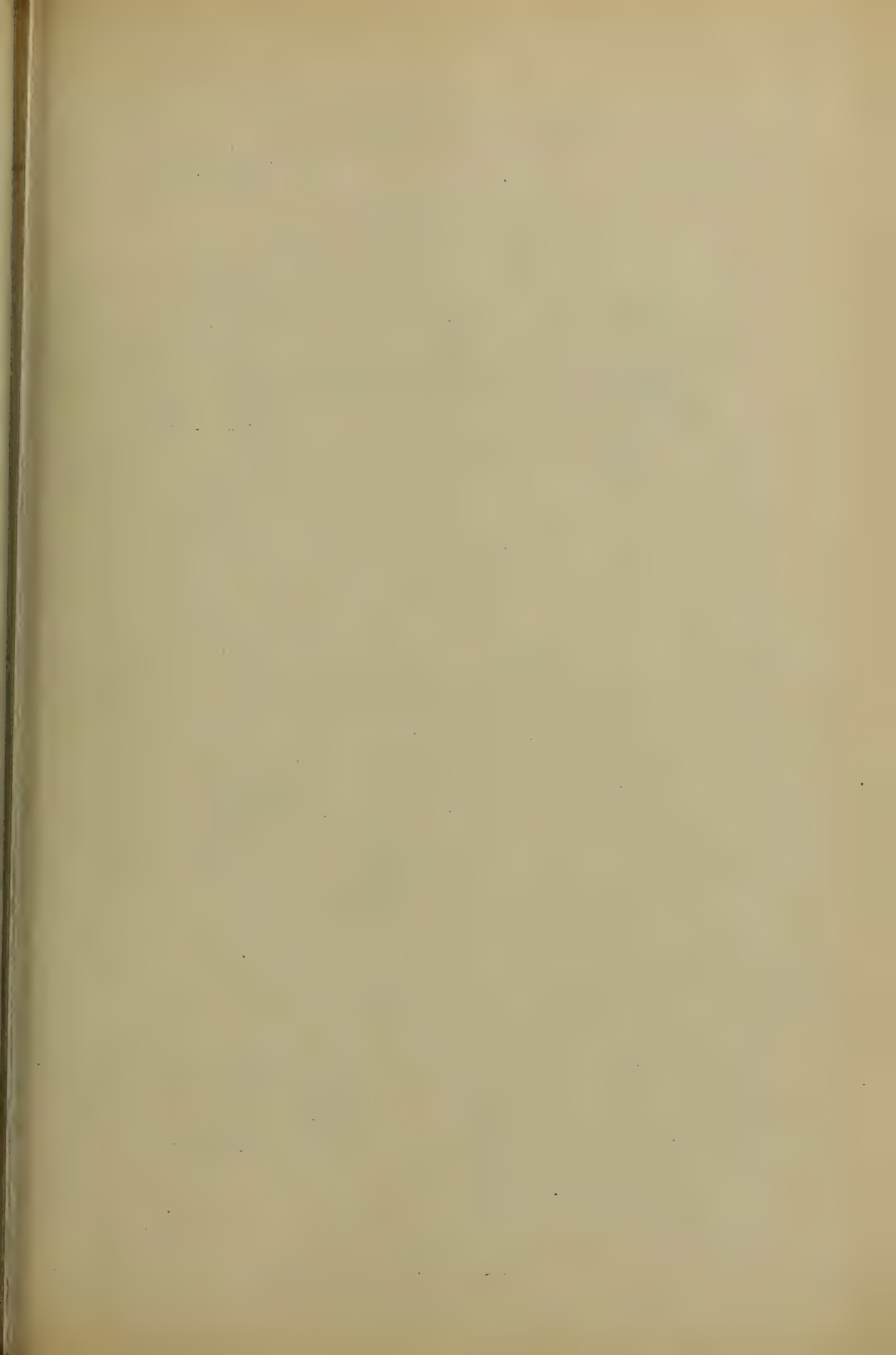


Fig. 6.



Witnesses:
 A. E. Gaither.
 Jas. N. Lorenz

Inventor:
 Joseph Eifel
 by attys
 Symmes & Carpenter

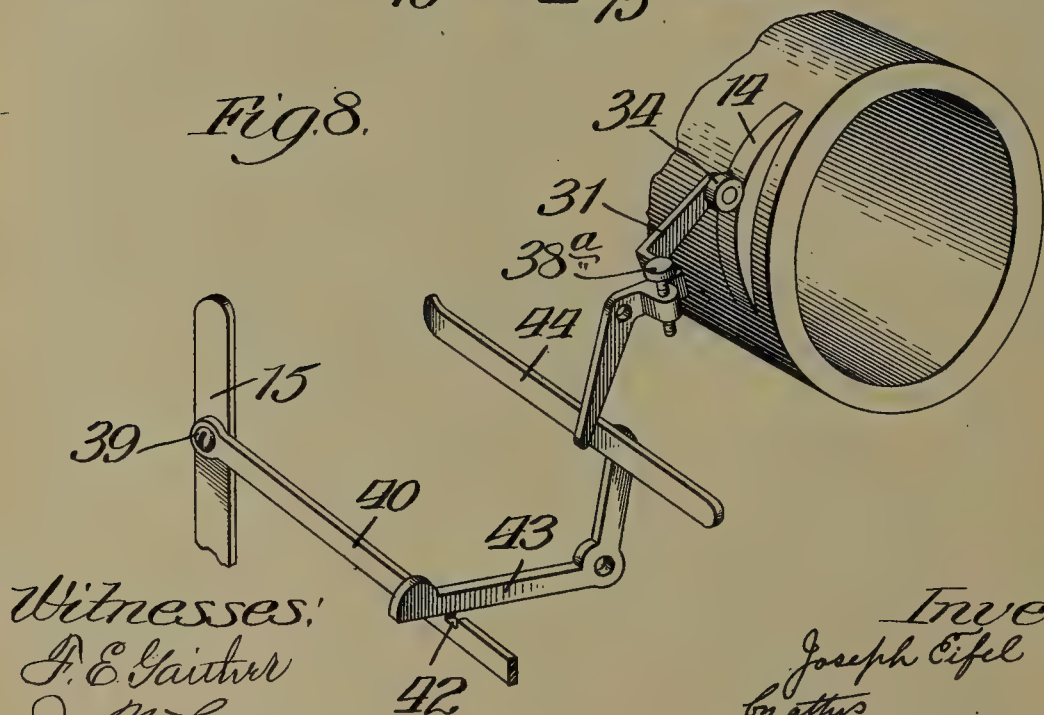
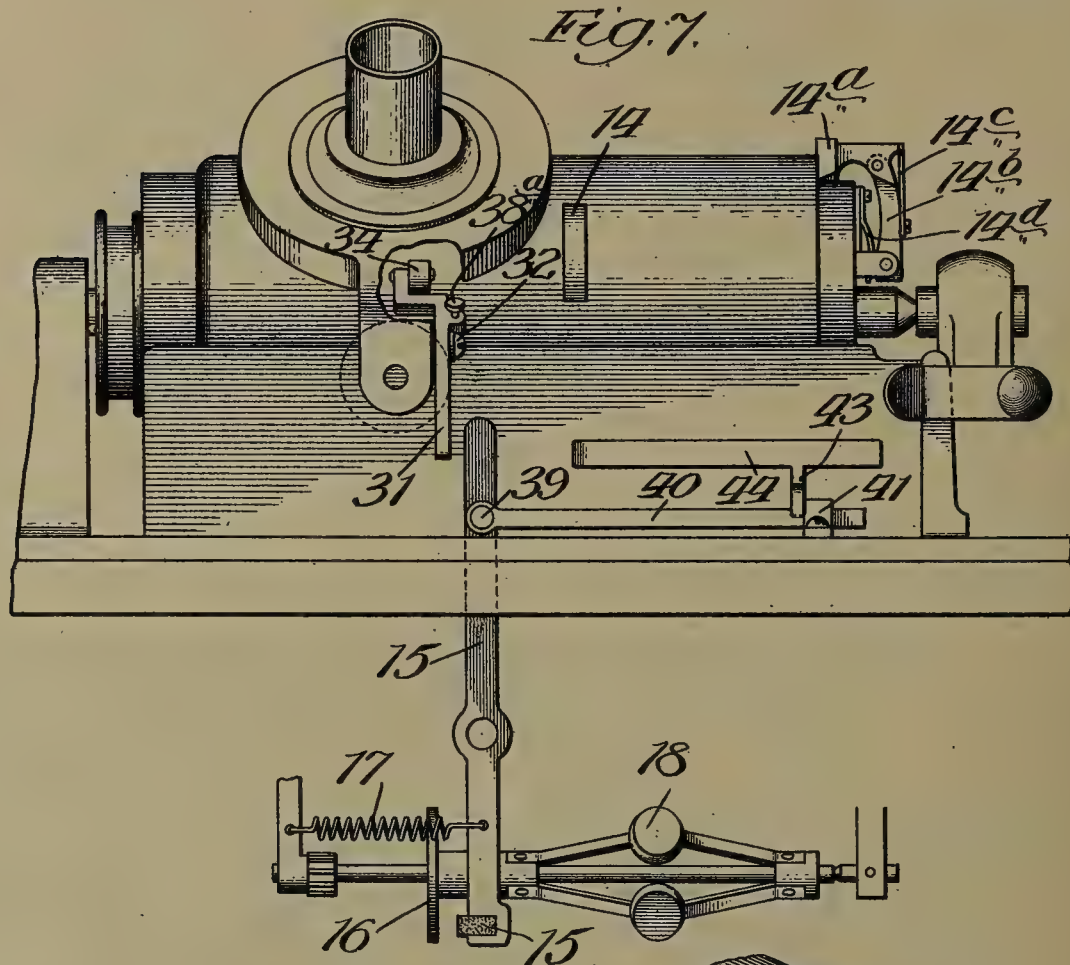


J. EIFEL.
 AUTOMATIC CUT-OFF FOR SOUND REPRODUCING MACHINES.
 APPLICATION FILED APR. 1, 1907.

904,187.

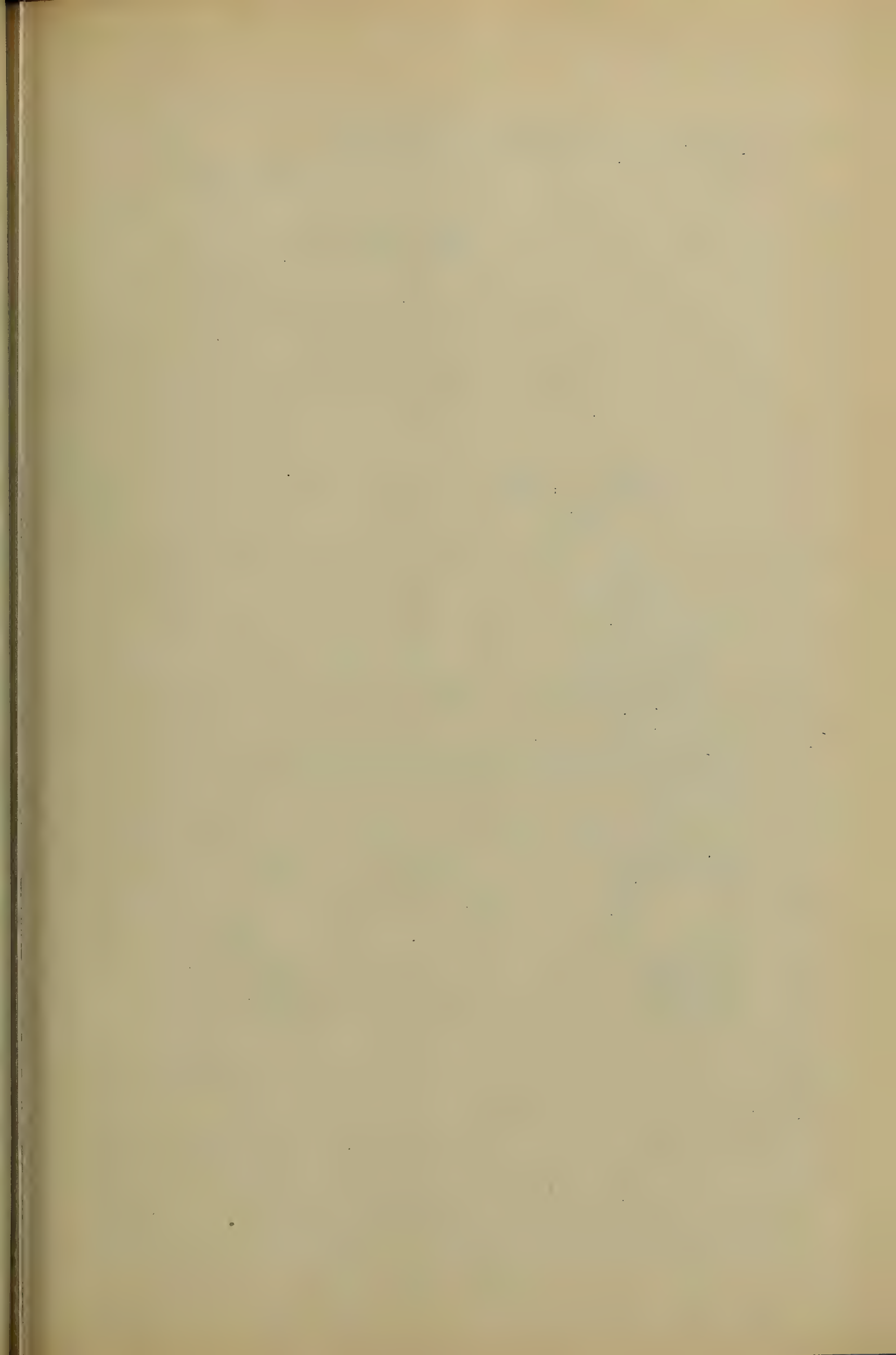
Patented Nov. 17, 1908.

4 SHEETS—SHEET 3.



Witnesses:
 J. E. Gaither
 J. M. Lorenz

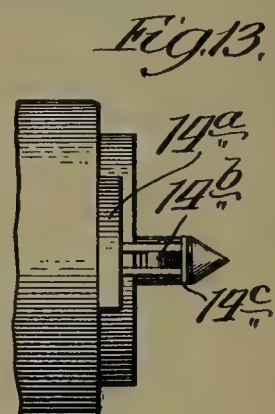
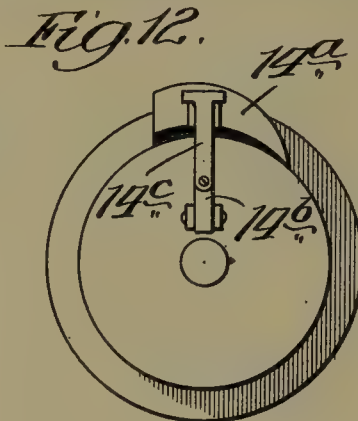
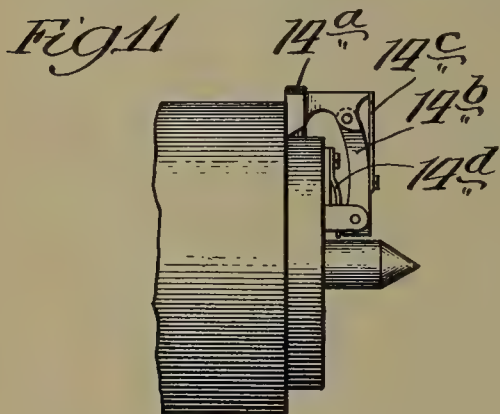
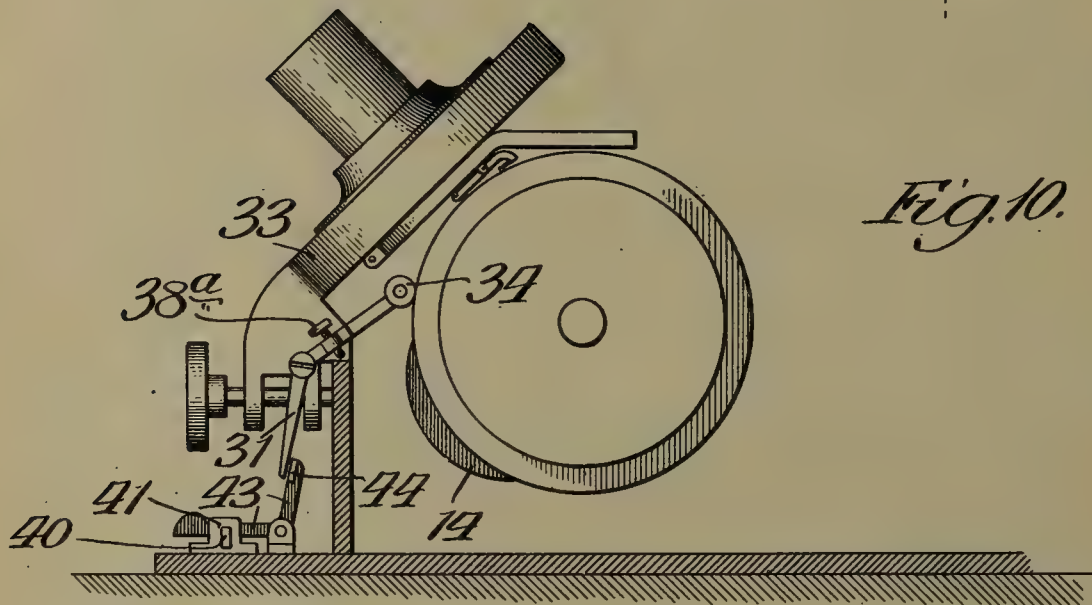
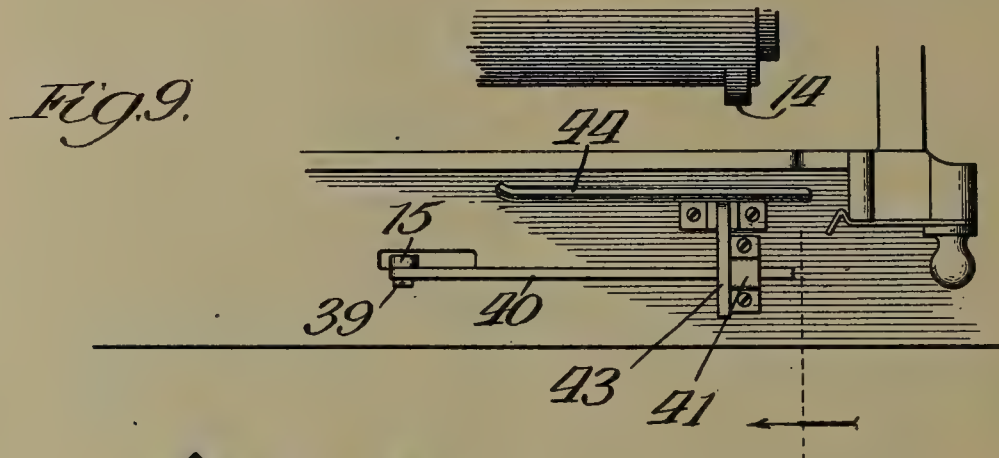
Inventor:
 Joseph Eifel
 by attys
 Synnestvedt & Carpenter



J. EIFEL.
 AUTOMATIC CUT-OFF FOR SOUND REPRODUCING MACHINES.
 APPLICATION FILED APR. 1, 1907.

904,187.

Patented Nov. 17, 1908.
 4 SHEETS—SHEET 4.



Witnesses:
 P. E. Gaither
 Jas. N. Lorenz

Inventor:
 Joseph Eifel
 by attys.
 Spinnestredt & Carpenter

UNITED STATES PATENT OFFICE.

JOSEPH EIFEL, OF CHICAGO, ILLINOIS.

AUTOMATIC CUT-OFF FOR SOUND-REPRODUCING MACHINES.

No. 904,187.

Specification of Letters Patent.

Patented Nov. 17, 1908.

Application filed April 1, 1907. Serial No. 365,682.

To all whom it may concern:

Be it known that I, JOSEPH EIFEL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Cut-Offs for Sound-Reproducing Machines, of which the following is a specification.

My invention relates to sound reproducing instruments wherein sounds are reproduced through the medium of a reproducer actuated by a record in motion, and more particularly to the mechanism employed to control the starting and stopping of the record, and its objects are; to provide a cheap, safe, and accurate means for automatically stopping the mechanism at the end of the record, or at any predetermined point when the complete record is not used; to provide means for actuating the cut-off mechanism which may be located at any desired point upon the record itself, or upon the mandrel carrying the record, and to generally improve the efficiency and reduce the cost of automatic cut-off devices for sound reproducing machines. While my device is adaptable to all forms of sound reproducing machines in which a moving record is employed to actuate the reproducer, it is particularly well adapted for use in connection with music boxes or phonographs employing a disk or cylindrical record, and in order to more clearly illustrate the above objects and other advantages which will hereinafter appear, I have shown it in connection with both types of machines, in the accompanying drawings, wherein—

Figure 1, is a plan view, with parts broken away, of a disk phonograph having my improvements applied thereto;

Figure 2 is a vertical section on the line II—II of Figure 1, through the disk and mandrel carrying the same, with the reproducer in position thereon, in elevation;

Figure 3 is a sectional detail of a portion of a disk record, showing one form of means employed to operate the cut-off mechanism;

Figure 4 is a vertical section on the line IV—IV of Figure 1, showing one form of stopping mechanism, consisting of a brake shoe and disk, together with the mechanism for operating the same when it is desired to start the machine;

Figure 5 is a similar section on the line V—V of Figure 1, showing the mechanism

employed to automatically operate the cut-off when the machine is to be stopped;

Figure 6 is a section on the line VI—VI of Figure 1, showing the catch employed to hold the stopping mechanism open when the machine is in operation;

Figure 7 is a front elevation of a cylindrical machine adapted to cut-off at two points, with a portion of the reproducer broken away to show the roller and its lever which serve to operate the cut-off mechanism;

Figure 8 is a detail perspective view of one end of a cylindrical record adapted to operate the cut-off mechanism together with the system of levers constituting the latter;

Figure 9 is a plan view of the cut-off mechanism;

Figure 10 is an end view partly in section, showing the parts in their running or open position;

Figure 11 is a side elevation of one end of a record and mandrel, together with the stop or projection carried upon the end of the mandrel, and

Figures 12 and 13 are an end and plan view respectively of the mechanism illustrated in Figure 1.

The means employed to actuate the cut-off mechanism is practically the same in both types of machines, and consists broadly of a series of levers actuated by a projection located at any desired point upon the record or mandrel carrying the same. The cut-off mechanism itself may be of the type commonly employed in such machines, which consists of a brake lever adapted to be thrown into contact with a brake disk by means of a spring, when it is desired to stop the machine, as shown in the drawings, or any other suitable stopping mechanism may be employed. The speed at which the record is rotated is controlled by a centrifugal governor of the usual type, as is also the driving means, and the same do not form part of the present invention which relates particularly to the mechanism employed to control the above described cut-off mechanism. This controlling mechanism is designed to be easily attached to any of the sound reproducing machines now on the market, by making a few minor changes in the parts used to start and stop such machines.

In the construction shown in Figures 1 to 6 inclusive, which illustrates the application

of my device to a disk machine, the spring 17 acts upon a rod 19 in such a manner as to thrust its inner end against the brake lever 15 when it is desired to stop the machine. The rod 19 is slidably mounted in bearings 20 attached to the underside of the lid of the box, and is provided upon its outer end with a knob or handle by means of which it can be withdrawn from contact with the lever 15 when it is desired to start the machine. The spring 17 surrounds and is attached at one end to the rod 19, and as its opposite end abuts against the outer bearing 20, the spring will always be under compression when the rod is withdrawn and the machine running, and will act to normally hold the parts in their locked position. When the rod 19 is withdrawn it is automatically locked in its release position, and the machine is free to run until a predetermined point upon the record has been reached, when the rod 19 is released and forced inward against the brake lever 15 by the expansion of the spring 17, and the machine stopped.

In order to provide for such locking and releasing of the rod 19, a lever 21 is pivoted at 22 to the underside of the lid of the box, and has its short arm, which is bifurcated, connected to the rod by means of a slot and pin connection 23, as shown in Figures 1 and 5. The opposite long end of the lever 21 is provided with a pin 24 projecting through a slot formed in the lid of the box as in Figure 6, and to the upper end of this pin is secured a flat bar 25 arranged at right angles to the lever 21 and slidably mounted in a bearing 26 secured to the upper side of the lid of the box. The flat bar 25 is provided upon its underside with a projection 27 which engages a lever 28 pivoted at one end, 29, to the lid of the box, in such a manner as to prevent the lever 21 being swung around its pivot point 22, until the lever 28 is depressed. The lever 28 is normally held in its raised position by means of a flat spring 30 interposed between it and the lid of the box, and is depressed to release the lever 21 and allow the spring 17 to apply the brake through the medium of an approximately U-shaped lever 31 in a manner to be presently described. The lever 31 is pivoted at the forward end of its horizontal portion by means of a screw 32, to the reproducer arm 33, and its forward end beyond said pivot point depends and is provided upon its lower end with a roller 34 held in close proximity to the record, in the path of the projection 14 in a manner to be presently described. A spring 35 is attached to the underside of the arm 31, and bears against a pin 36 in the arm 33 in a manner to normally hold the roller 34 adjacent the record, and the opposite depending portion 37 of the arm 31 free of the lever 28. In order

that the spring 35 may not cause the roller 34 to bear upon the record, I provide an adjusting screw 38 upon the arm 33, in line with the pin 36 to bear against the upper edge of the lever 31, when the machine is running.

The operation of the device is as follows: The rod 19 is pulled out, releasing the brake lever 15 and allowing the machine to start. Such movement of the rod 19 also compresses the spring 17 and shifts the lever 21, which is then locked in position by means of the lever 28 and projection 27 on the rod 25, as shown in Fig. 6. At the same time the roller 34 is adjacent to the record, and being connected to the reproducer arm, follows the course of the sound groove until it comes into contact with the projection 14, which causes the forward end of the lever 31 to rise against the spring 35 thereby depressing the rear end 37 of the lever 31, which in turn depresses the lever 28 and releases the bar 25, thus allowing the spring 17 to shift the rod 19 into engagement with the brake lever 15, when the brakes are set and the machine brought to a standstill. From the foregoing it will be seen that the machine may be stopped at any point at which the projection may be located, or by varying the number of projections it can be started and stopped as often as desired, and in the case of a machine using a cylindrical record, as illustrated in Figure 7, the final stop may, if desired, be located upon the mandrel carrying the record, instead of on the record itself, in order that the sound groove may extend to the extreme end of the record. While I prefer to make the projection on the record, of the form shown in Figures 3 and 8, wherein the same is highest at the center and inclines towards each end, any preferred form of projection may be used, and the projection may be made a part of the record itself, or in the form of a plug set in the record, as desired.

In Figures 7 to 13 inclusive, I have shown my device as applied to a phonograph of the ordinary commercial cylindrical type, and in this instance the brake lever 15 is directly connected to the spring 17 at its lower end in the usual manner, and has its upper end extending through a slot in the lid of the box in order to form a handle for shifting it to start or stop the machine. By reference to Figure 7 it will be seen that it is not necessary to alter the cut-off mechanism in order to apply my device, as it is secured to the top of the box and connected to the upper end of the lever 15 by a pivotal screw 39 of the simplest construction. The lever 31 carrying the roller 34 is pivoted to the reproducer support at 32 as in the disk machine, but the spring 35 is dispensed with, as the force of gravity will be sufficient to hold the roller 34 in proper relation to the record; the movement of the lever towards the record being con-

trolled by means of a set screw 38^a in the lever 31 which bears against the top of the frame supporting the record during the entire movement of the latter.

5 The lever 15 is automatically locked and released through the medium of a bar 40 connected thereto at one end by means of the pivot 39, and having its other end slidably supported in a bearing 41 secured to the top
10 of the box. The bar 40 is also provided with a notch 42 which engages with the lower arm of a bell crank lever 44 pivotally mounted upon the top of the box and provided with a transverse extension 44 upon its upper end,
15 said extension being so disposed with relation to the record that it will be acted upon by the lower end of the lever 31 when the roller 34 comes into contact with the projection 14 in a manner to disengage the lever 43
20 from the notch 42, thereby allowing the spring 17 to contact and bring the lower end of the lever 15 into contact with the disk 16, whereby the machine is stopped.

As shown in Figures 7, 11, 12, and 13, the
25 projection on the end of the mandrel may consist of a head 14^a pivotally connected to the upper end of a vertical link 14^b which in turn is pivoted at its lower end to the head of the mandrel in such a manner that it, together with the head 14^a, can be swung
30 within the circumference of the mandrel when it is desired to adjust or remove a record therefrom. The link 14^b is held in an upright or a horizontal position by means of
35 a spring 14^d interposed between it and the head of the mandrel, and a spring 14^c secured to the back of the link acts in a similar manner to hold the head 14^a securely in its operative position. Other advantages of
40 the device will readily occur to those familiar with the art.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent, is the following:
45

1. The combination with a sound reproducing machine, of a cut-off therefor comprising in combination, a brake, yielding means for normally holding it in braking
50 position, a catch for holding it in release position, a pivotally mounted tripping lever mounted to move with the reproducer and having one end in position to engage the catch, and means mounted to move with the
55 rotating record support in position to engage the other end of the tripping lever.

2. The combination with a sound reproducing machine, of a cut-off therefor comprising in combination, a brake, yielding means for normally holding it in braking position, a catch for holding it in release position, a pivotally mounted tripping lever mounted to move with the reproducer and having one end in position to engage the
60 catch, and a projecting means mounted to

move with the rotating record support in position to engage the other end of the tripping lever.

3. The combination with a sound reproducing machine, of a cut-off therefor comprising in combination, a brake, yielding means for normally holding it in braking position, a catch movable in a substantially vertical plane for holding it in release position, a tripping lever mounted to move with the
70 reproducer and pivotally supported for oscillation in a substantially vertical plane with one end in position to engage and operate the catch, and means mounted to move with the rotating record support in position
75 to engage and raise the other end of the tripping lever so that the catch is disengaged.

4. The combination with a sound reproducing machine having a mandrel for supporting a cylinder record, of a cut-off therefor comprising a brake yieldingly held normally in engaging position, a catch for holding the brake in inoperative position, a tripping lever pivoted intermediate its ends to move with the reproducer, and means
80 mounted to move with the mandrel for engaging the tripping lever, the tripping lever and the catch being provided with elongated engaging means whereby the catch is adapted to be engaged by the tripping lever during a considerable portion of the movement
85 of the reproducer.

5. The combination with a sound reproducing machine having a mandrel for supporting a cylinder record, of a cut-off therefor comprising a brake yieldingly held normally in engaging position, a catch for holding the brake in inoperative position provided with an elongated bar extending along the path of travel of the reproducer, a tripping lever pivoted intermediate its ends to move with the reproducer and having one end in position to engage the elongated bar, and means mounted to move with the mandrel for engaging the other end of the tripping lever.
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6. The combination in a sound reproducing machine, of a cut-off mechanism and an operating member therefor movably mounted upon the mandrel of the machine in such
115 manner that it may project above the face of the record to operate the cut-off mechanism or may be withdrawn within the circumference of the record to permit its removal from the mandrel.
120

7. The combination in a sound reproducing machine, of a cut-off mechanism and an operating member therefor pivotally mounted upon the end of the mandrel of the machine and adapted in one position to project
125 above the face of the record for operating the cut off mechanism and in another position to lie within the circumference of the mandrel to permit the removal of the record from the mandrel.
130

8. The combination in a sound reproducing machine, of a cut-off mechanism and an operating member therefor comprising a link pivoted to the end of the mandrel and having
5 a head which can be swung into position adjacent to and projecting above the face of the record.

9. The combination in a sound reproducing machine, of a cut-off mechanism and an
10 operating member therefor comprising a link pivoted to the end of the mandrel and having a head which can be swung into position adjacent to and projecting above the face of the record and a spring for holding the link
15 in position.

10. The combination in a sound reproducing machine, of a cut-off mechanism and an

operating member therefor comprising a link 14^b pivoted to the end of the mandrel and provided with the pivoted head 14^a. 20

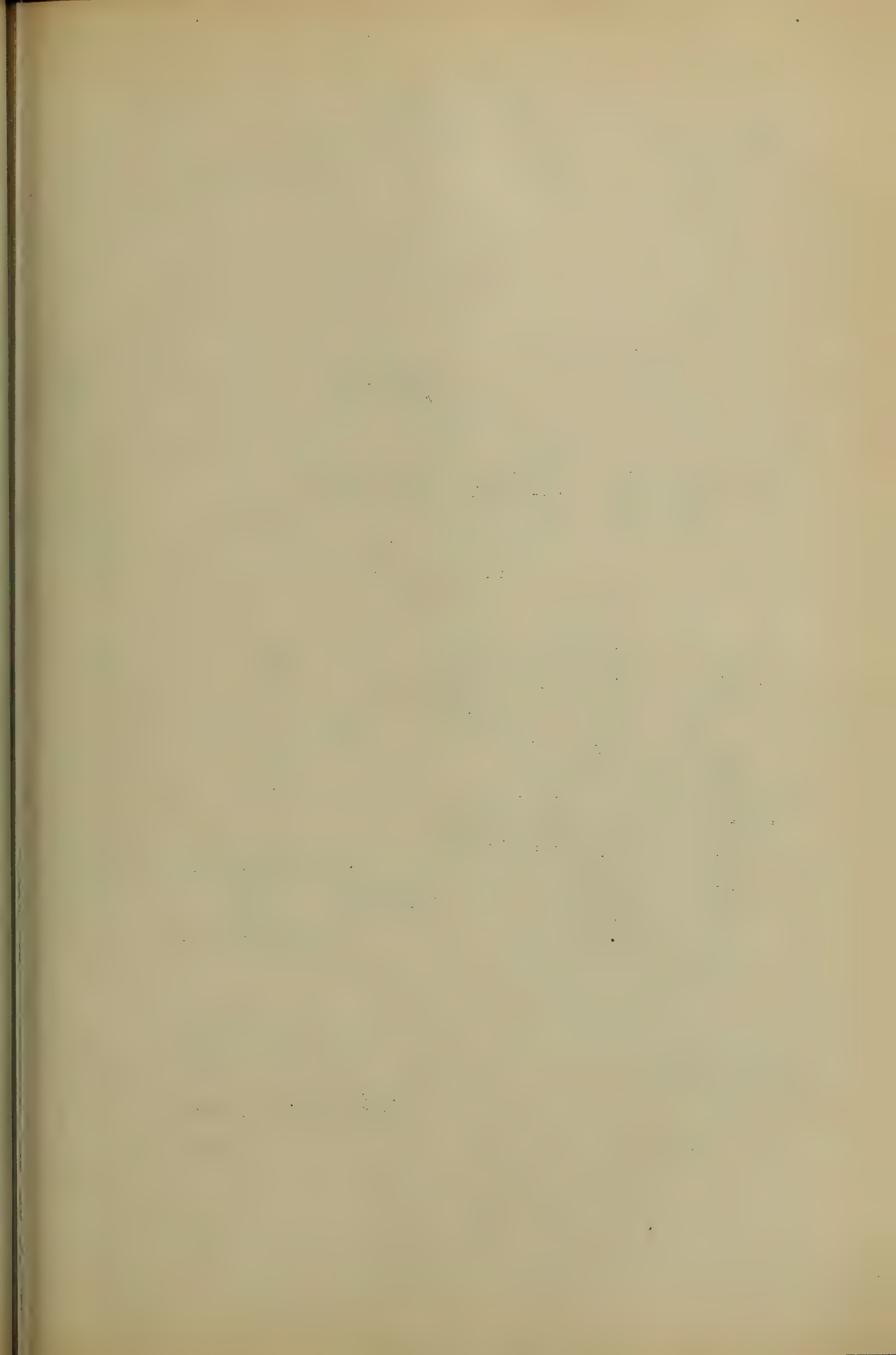
11. The combination in a sound reproducing machine, of a cut-off mechanism and an operating member therefor comprising a link 14^b pivoted to the end of the mandrel and provided with the pivoted head 14^a and
25 spring means for holding the parts in position.

In testimony whereof, I have hereunder signed my name in the presence of the two subscribing witnesses.

JOSEPH EIFEL.

Witnesses:

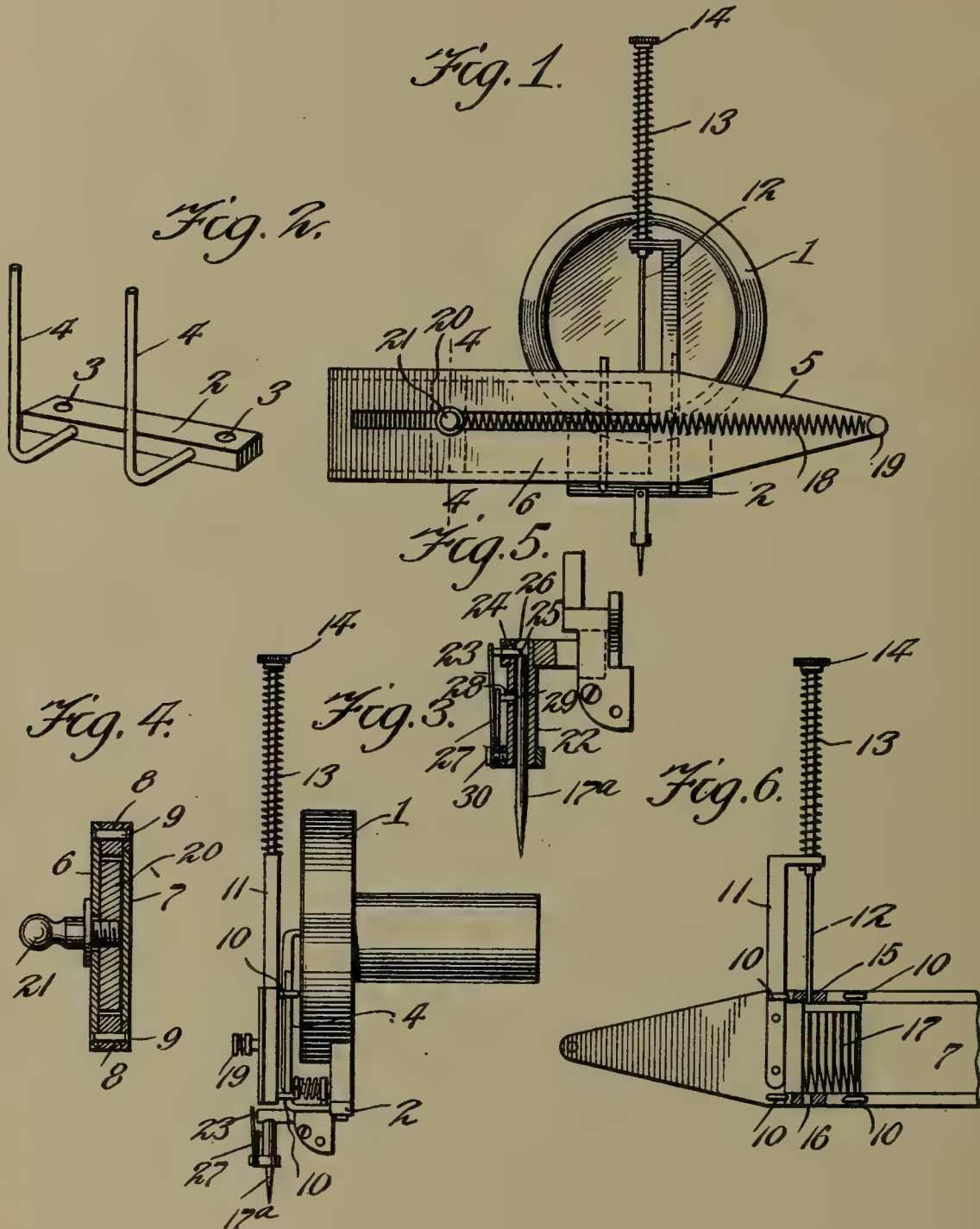
PAUL CARPENTER,
JAY H. BROWN.



W. S. RODENBERGER.
 GRAPHOPHONE ATTACHMENT.
 APPLICATION FILED JUNE 28, 1907.

904,453.

Patented Nov. 17, 1908.



Witnesses
 Geo. Ackerman
 E. B. Bump

Inventor
 Winfield S. Rodenberger
 By Victor J. Evans
 Attorney

UNITED STATES PATENT OFFICE.

WINFIELD S. RODENBERGER, OF LINTON, INDIANA.

GRAPHOPHONE ATTACHMENT.

No. 904,453.

Specification of Letters Patent.

Patented Nov. 17, 1908.

Application filed June 28, 1907. Serial No. 381,306.

To all whom it may concern:

Be it known that I, WINFIELD S. RODENBERGER, a citizen of the United States of America, residing at Linton, in the county of Greene and State of Indiana, have invented new and useful Improvements in Graphophone Attachments, of which the following is a specification.

This invention relates to graphophone attachments, and one of the principal objects of the same is to provide simple, reliable and efficient means for feeding needles to the sound box.

Another object of the invention is to provide a magazine containing needles and to provide means whereby said needles may be quickly inserted in the stylus holder of the sound box, and at the same time drive out the old needle.

In the use of graphophones it becomes necessary to insert a new needle after one or two reproductions, and these needles being small, it is quite difficult to feed them in place properly by hand.

My invention has for its object to provide means for quickly removing the old needle and inserting a new one in its place.

These and other objects may be attained by means of the construction illustrated in the accompanying drawing, in which:

Figure 1 is a front elevation of a graphophone sound box or reproducer having my attachment connected thereto. Fig. 2 is a perspective view of the supporting bracket for the needle magazine. Fig. 3 is a side elevation of my attachment. Fig. 4 is a vertical section on the line 4—4 of Fig. 1. Fig. 5 is a sectional view of the stylus holder. Fig. 6 is a detail rear side elevation of the magazine and the plunger.

Referring to the drawing for a more particular description of my invention, the numeral 1 designates the sound box or reproducer of a graphophone of ordinary construction, and 2 is a bracket secured to the sound box by means of screws passed through the openings 3 in said bracket. Supporting arms 4 extend outward and upward from said bracket 2. It will be understood, of course, that other means may be utilized for supporting the magazine upon the sound box or reproducer, depending upon the shape and manner of attachment of said reproducer.

The magazine 5 may consist of a front plate 6, a sliding back plate 7 and spacing

strips 8 through which suitable fasteners 9 are passed to hold the parts in relative position. Suitable loops 10 are provided upon the back of the magazine in proper position to receive the arms 4 on the bracket 2 to support the magazine in proper position. A plunger support 11 is connected to the magazine and a plunger rod 12 passes through a hole in said support and is provided with an encircling spring 13 which holds the plunger up in the position shown in Fig. 6. The plunger 12 is provided with a suitable head or button 14. The end of the plunger extends through an opening 15 in the upper edge of the magazine in line with the feed openings 16 at the lower edge of the magazine. A series of needles 17 are placed in the magazine and are fed toward the feed opening 16 by means of a spring 18 connected at one end to a stud 19 while the opposite end is connected to a block 20 fitted to slide in the magazine. Connected to the block 20 is a knob 21 by means of which the block 20 may be moved backward whenever it is required to refill the magazine.

The stylus or needle holder 22 is provided with a detent consisting of a spring 23 and a pin 24 having a beveled end 25 which will permit the plunger 12 to move past it or the needle 17 to be driven through the opening 26 to drive out the needle 17^a. The pin 24 prevents the upward movement of the needle 17^a and said needle is prevented from moving downwardly by means of a spring 27 provided with a stud 28 which passes through an opening 29 in the needle holder and bears with sufficient friction against the needle to prevent it from dropping out. The springs 23 and 27 are held in place by a pin 30.

The operation of my invention may be briefly described as follows: Whenever it is desired to force out the old needle and to replace it by a new one, the plunger 12 is pushed downward which pushes one of the needles 17 through the opening 26 against the needle 17^a to push the same out of the needle holder, while the new needle 17 takes its place, and is held in the same position as was the needle 17^a. After each needle has been inserted the spring 18 moves the sliding block 20 and the column of needles into position so that one needle always occupies a position immediately above the feed opening 16, as will be understood.

From the foregoing it will be obvious that

an attachment made in accordance with my invention is comparatively simple in construction; can be attached to any form of reproducer without material change in the form of bracket; that the needles can be fed instantly without requiring exact fitting as would be the case by hand, and that the attachment, as a whole, can be produced at slight cost.

Having thus described the invention, what I claim is:

The combination of a graphophone reproducer provided with a bracket having upwardly extending supporting arms, a magazine for stylus needles provided with loops or eyes upon its rear surface to engage said arms, a guideway in said magazine to support a column of needles, a block fitted to

slide in the guideway, a spring connected to said block at one end and to a stud on the magazine at the opposite end, a plunger for forcing one needle at a time out of the magazine into the needle holder of the reproducer, a spring detent having a beveled end disposed within the throat of the needle holder, and a spring having an inwardly projecting stud to bear against the needle to prevent it dropping out until forced home by the plunger.

In testimony whereof, I affix my signature in presence of two witnesses.

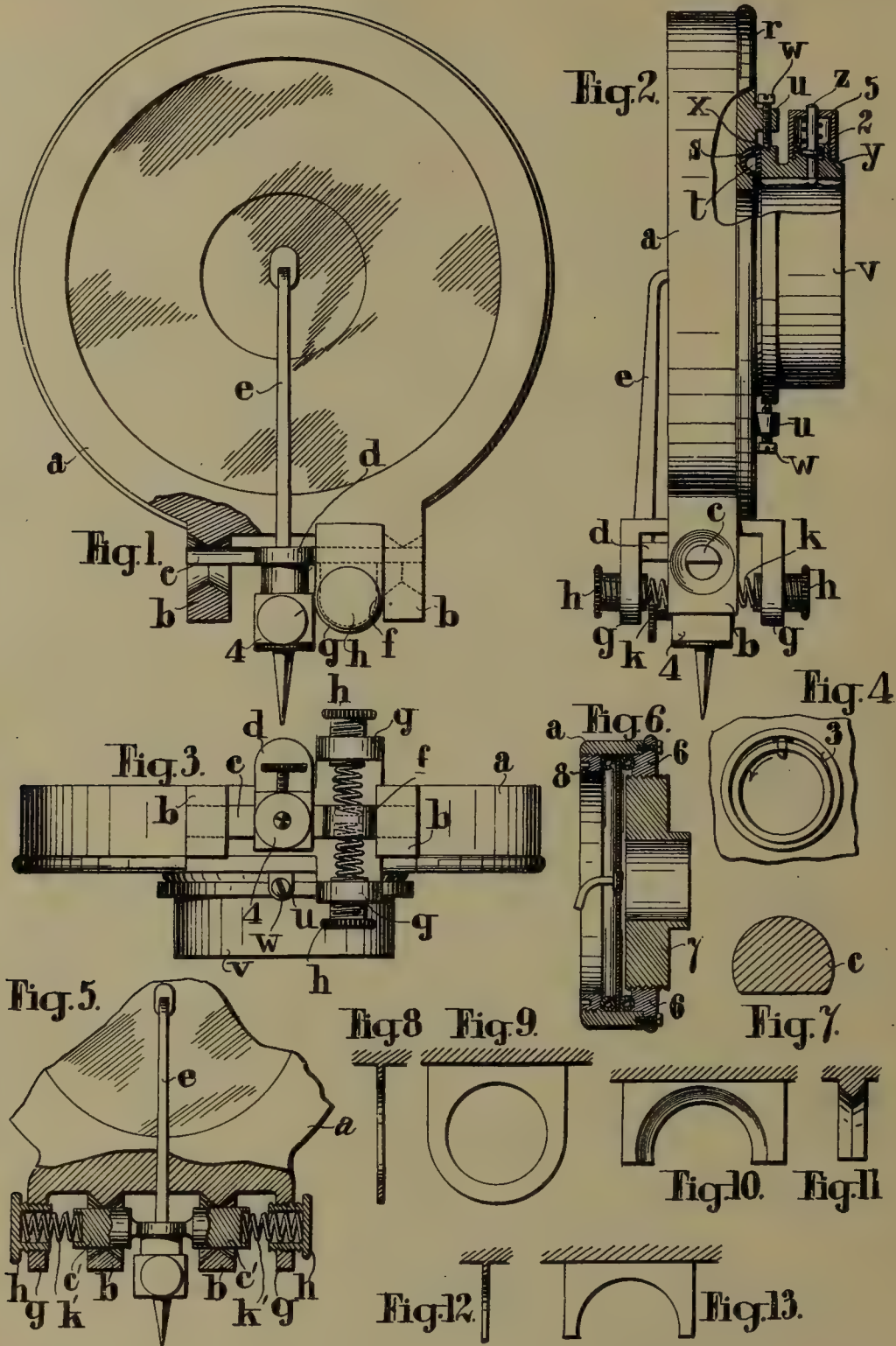
WINFIELD S. RODENBERGER.

Witnesses:

J. S. WHITLEY,
CUMMING BENNIE.

904,523.

Patented Nov. 24, 1908.



Witness:
F. R. Pitton
J. H. Kinsten

Inventor:
Alex Fischer
By William Fisher & Witherpoon
his Attorneys

UNITED STATES PATENT OFFICE.

ALEX FISCHER, OF KENSINGTON, LONDON, ENGLAND.

SOUND-BOX FOR TALKING-MACHINES.

No. 904,523.

Specification of Letters Patent.

Patented Nov. 24, 1908.

Application filed February 3, 1908. Serial No. 414,070.

To all whom it may concern:

Be it known that I, ALEX FISCHER, a subject of the King of England, residing at 16 Maelise road, Kensington, in the county of London, England, have invented certain new and useful Improvements in the Construction of Sound-Boxes for Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in the construction of sound boxes for talking machines of the disk type.

Hitherto in nearly all sound boxes the plate carrying the stylus and stylus bar is placed on knife edges or points and is pressed against the same by springs or by some other devices. These springs or other devices also perform the function of holding the stylus and the stylus bar in position. Unless these springs or other devices press the plate against the knife edges etc., tightly, there is jarring, when the sound box is played and in consequence the reproduction is bad. But this pressure also makes the stylus and the stylus bar rigid and, therefore, they are not free and sensitive enough to react to fine impulses of the stylus produced by the turning record. To improve this, I place the spindle carrying the stylus bar on two sensitive hinges as hereinafter described or in the known form of simple hinges or on center points which enter center holes in the plate, and I form an arm on the spindle which takes between two spiral or other springs. By these means the spindle will be quite free to react to the finest impulses, the springs having no other function than to hold the stylus and the stylus bar in position. The reproduction, therefore, becomes broad in tone, soft and natural and full of shading. There are, however, other advantages as well in this construction. The tension of the diaphragm can be regulated to a nicety by pushing the arm backwards or forwards as it is maintained in position by means of the springs. Both springs may be screwed tighter or looser according to the requirement of the record to be played or the nature of the diaphragm. And in order that my said invention may be better understood I will now proceed to describe the same with

reference to the drawings accompanying this specification, in which:—

Figure 1 shows a front elevation of a sound box constructed according to my improved invention. Fig. 2 is a side view of the same, partly in section. Fig. 3 is an edge view thereof. Figs. 4 to 13, inclusive, show modifications and details hereinafter referred to.

The same letters and numerals of reference are employed to denote the same parts in all the views.

a shows the shell of the sound box. On this shell I mount two brackets *b, b*.

c shows a spindle passing through the brackets *b, b*. To the spindle *c* is connected (or it may be formed therewith) an arm *d*, to which the stylus bar *e* is fixed. Attached at right angles to the arm *d* is another arm *f*, recessed at each side.

g, g are two other brackets in which are screwed hollow nuts *h*.

k, k are two compression springs, one end of each of which passes into the hollow nuts *h*, and the other ends bear against the arm *f*.

Attached to the under part of the spindle *c* is a needle holder 4.

The spindle *c* is formed circular or partly circular in cross section, and the brackets *b, b* are oppositely beveled so that the bearing surface on the spindle *c* is reduced to a minimum. The spindle *c* to which the stylus bar *e* and the needle holder 4 are attached is in this way sensitively hinged to the shell *a* of the sound box. The tension of the diaphragm can be regulated by the action of the springs *k* and the hollow nuts *h* on the arm *f*. By screwing the front hollow nut in or the back out, the stylus bar, which is fixed to the diaphragm, will pull it (the diaphragm) and thus increase the tension of same. By screwing the back hollow nut in or the front one out, the stylus bar will be pushed towards the diaphragm and lessen the tension on same. Screwing the two nuts equally in, will not alter the position of the stylus bar, but will only stiffen the springs; while screwing them both out equally, will make the springs weaker without affecting the position of the stylus bar in any way.

The brackets marked *b* through which the ends of the spindle *c* pass may be made with a bevel bearing or may be made of a thin ring or its equivalent so as to give the spindle *c* a

minimum amount of bearing surface. The bracket *b* would then be formed with a hole of similar shape to the cross section of the aforesaid spindle *c*, namely circular or partly circular and in this form I may have either a bevel bearing or a thin part ring as aforesaid.

Fig. 7 shows cross section of the end of the spindle, but it may be made of an entire circle or any part of a circle.

Figs. 8 to 13 show several modified forms of bracket bearings; Figs. 8 and 9 show cross section and side view of a thin ring bearing; Figs. 10 and 11 show end elevation and side view of a bevel bearing having a hole which may correspond to the cross section of the end of the spindle *c* or it may be made circular or partly circular. Figs. 12 and 13 show two corresponding views to Figs. 10 and 11 but of a thin plate bearing.

Fig. 5 shows front elevation, partly in section, of a modified form of sound box using the compression springs. In this case the spindle *c'* has two circular ends which work in a bevel guide bearing *b*. The spindle *c'* has at each end recesses into which compression springs *k'* fit such compression springs being held in position by screw nuts *h* held by brackets *g* attached to the shell *a* of the sound box. The rest of the construction may be the same as that at Figs. 1 to 3, that is springs *k* may also be fitted on either side of the spindle *c*.

It may here be observed that in place of spiral springs such as those marked *k* flat springs may in all cases be fitted if preferred or found desirable.

In sound boxes so constructed the spindle carrying the stylus bar and needle holder turns, as shown, on a correspondingly formed guide bearing in the brackets *b*, whereas in all other known constructions of sound boxes the spindle does not turn but rocks on knife edges, points or the like, including the known construction where the spindle is provided with center holes and turns again on center points in those center holes.

I do not wish to limit myself to spiral springs, taking between them the small arm on the spindle, or to the use of hollow nuts, as these may be varied without departing from the principle of my invention. I may also use one tension adjusting spring on one side of the spindle only, instead of two, or one on each side, as described. I may also construct a cheaper form of sound box without diaphragm tension adjustment, where the spindle will be hinged as described, without the brackets *g*, *g* hollow nuts *h*, and springs *k*, *k* and of course without the arm *f*. I also do not wish to limit myself to the precise forms of the brackets *b* shown or described as equivalents may be used without departing from the principle of the invention which

consists in having the end of the spindle cylindrical or partly cylindrical turning on a suitably formed guide bearing offering the minimum amount of surface.

Referring to Figs. 1 to 3, *r* shows the back plate of the sound box. This back plate is provided with an annular groove *s*, into which a rubber washer *t* (preferably tubular) is placed. *u*, *u* show two small brackets attached to the back *r*. *v* is a flanged tube forming the sound exit tube fixed on to the back of the sound box by center screws *w* screwing through the brackets *u* and into two center holes *x* in the flange of the tube *v*. In this position the flange of the ring *v* presses tightly against the hollow rubber ring *t*, making a flexible sound tight joint, which will allow the sound box a small turn around its vertical axis, the center screws forming the turning axis. On the tube *v* I form a boss *y* into which a spring pin *z* is fitted, such spring pin being provided with a flange 2 to limit its action, so that the bottom of the pin may enter a hole in the tone arm or trumpet in order to attach the sound box firmly thereto. 5 is a cap screwed on the boss *y* to hold the spring in position.

Fig. 4 shows a simplified form of spring for the pin. Instead of having the spiral spring and cap 5 screwed to the boss *y*, I have a rubber ring 3 passing round the tube *v* and over the head of the pin. At its lower end the spring pin is so formed that the sound box can only be turned in one direction, suitable means being employed to prevent the spring pin from turning round its vertical axis. Two holes (preferably opposite one another) are provided on the small end of the tone arm, on to which the sound box is pushed. In these holes the pin *z* springs, which will lock the sound box to the tone arm in the playing position, and with a half turn the sound box will be brought in position for changing the needle easily. The spring pin at its lower end is cut on the slant and will allow the sound box to be turned round in the direction as indicated by the arrow (Fig. 4) while a turn in the opposite direction will be impossible. By turning the sound box the pin held down by the spiral springs and cap or rubber ring will be pushed up, or slide up and ride on the top of the sound arm until the hole is reached again. An annular shallow groove may be provided on the tone arm connecting the two holes to form a guide for the pin to prevent the sound box from slipping off when not locked in the holes.

I may also use on the back of the sound box instead of the screws *w*, the brackets *u*, and the center holes *x* on the flanged tube *v*, other equivalent devices, say, hinging the flanged tube by simple hinges so as to allow a slight turn around its vertical axis.

In other respects the shell *a* and the back

of the sound box are of known type, but I may in some cases construct them as shown in detail at Fig. 6, in which figure the back *r* of the sound box is formed in two portions, the ring portion 6 of which is fixed to the shell *a* of the sound box. There is also a center portion 7 which is screwed or pushed into the ring portion 6 and screwed therein or otherwise suitably fixed at any required distance from the diaphragm. This construction will allow variation of the air space between the diaphragm and the back of the sound box. I may also form the shell part *a* in two portions, making a separate ring portion and a ring 8 screwing into same. This construction also enables the pressure of the two rubber gaskets which hold the diaphragm between them to be varied, by screwing the ring 8 into the shell portion *a*.

What I claim and desire to secure by Letters Patent of the United States of America is:—

1. In a talking machine, the combination of a casing, a diaphragm in said casing, a pair of guide bearings rigid with said casing, a spindle provided with a circular side mounted in said guide bearings, a stylus bar attached to the said spindle and to the said diaphragm, an arm carried by said spindle, a pair of brackets on said casing, a pair of springs, one on each side of said arm, located between said arm and said brackets, in line with each other and oppositely located, and

a needle holder attached to said spindle, substantially as described.

2. In a talking machine, the combination of a casing; a diaphragm in said casing; a pair of perforated brackets rigid with said casing; a spindle provided with a flat and a circular side mounted in said brackets; a stylus bar attached to said spindle and to said diaphragm; a pair of springs for controlling said bar; a pair of hollow nuts for controlling said springs; and a needle holder also attached to said spindle, substantially as described.

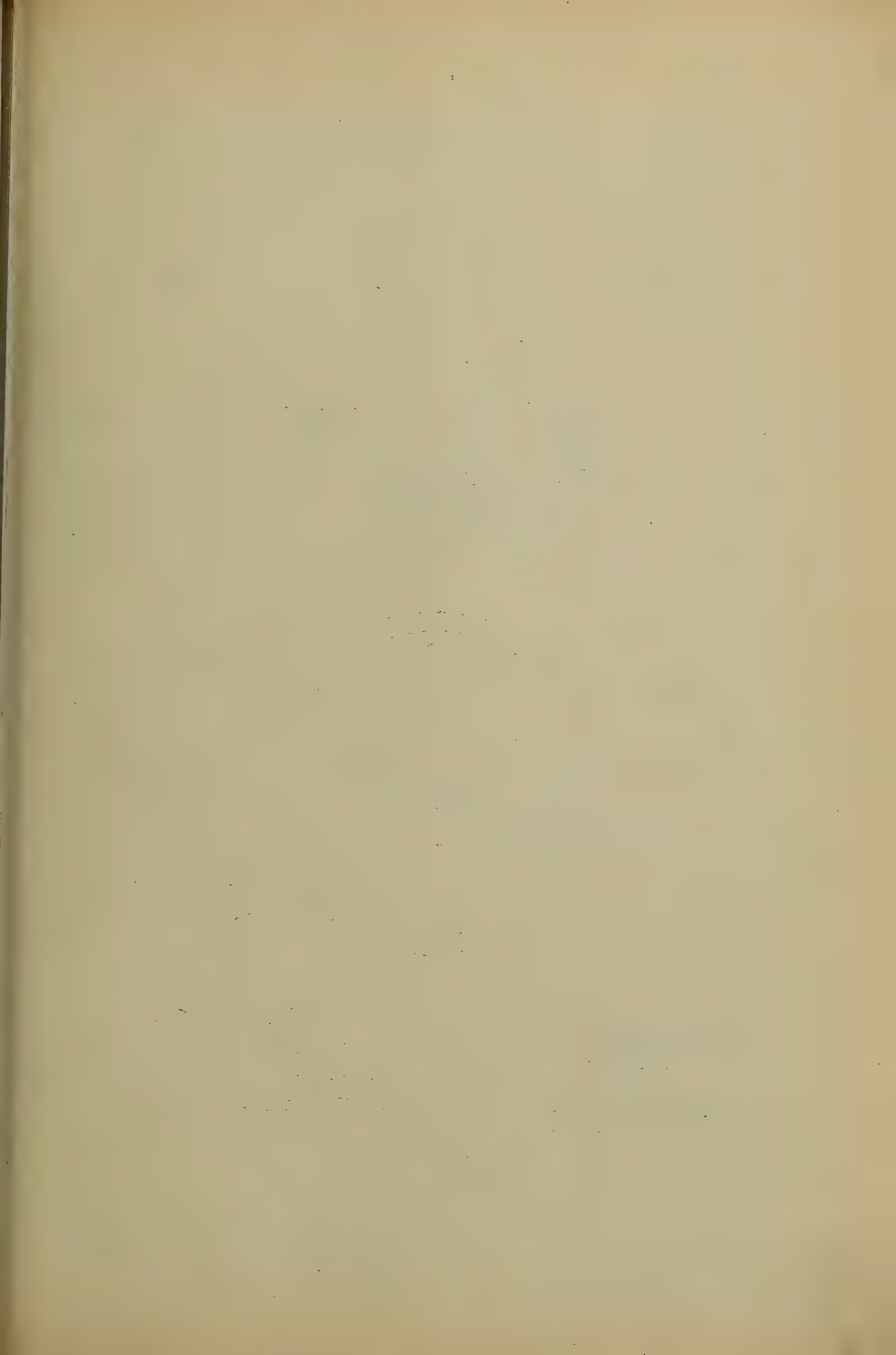
3. In a talking machine, the combination of a casing; a diaphragm in said casing; a pair of oppositely beveled perforated brackets rigid with said casing; a spindle provided with a flat and a circular side mounted in said brackets; a stylus bar attached to said spindle and to said diaphragm; a second pair of brackets on said casing; a pair of springs for controlling said bar; a pair of hollow nuts for controlling said springs mounted on said second pair of brackets; and a needle holder also attached to said spindle, substantially as described.

In testimony whereof, I affix my signature, in presence of two witnesses.

ALEX FISCHER.

Witnesses:

LILY SIMMONDS,
A. BOURNE.



904,853.

Patented Nov. 24, 1908.

Fig. 1

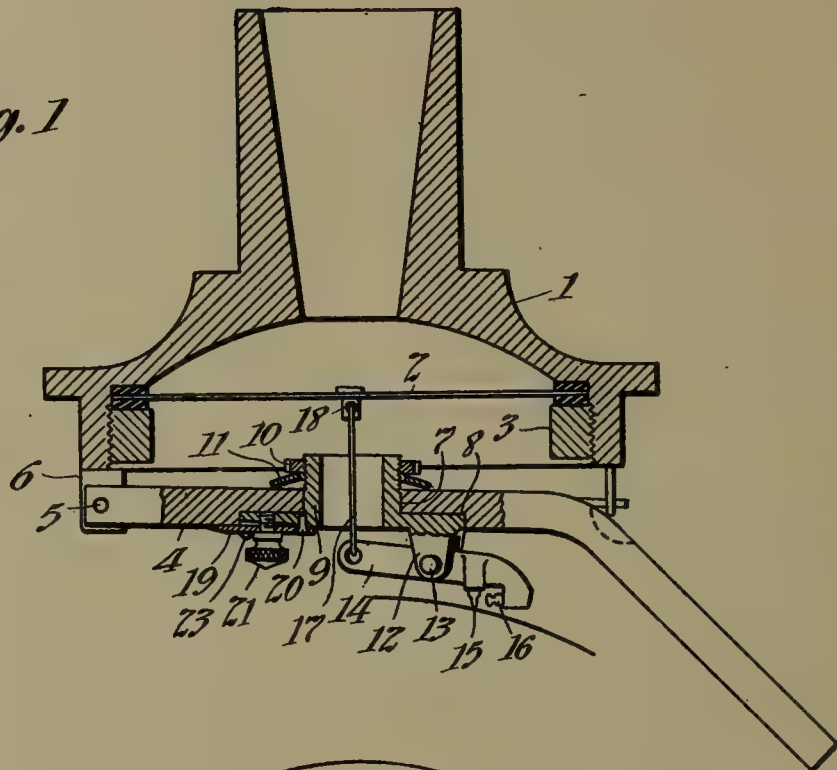
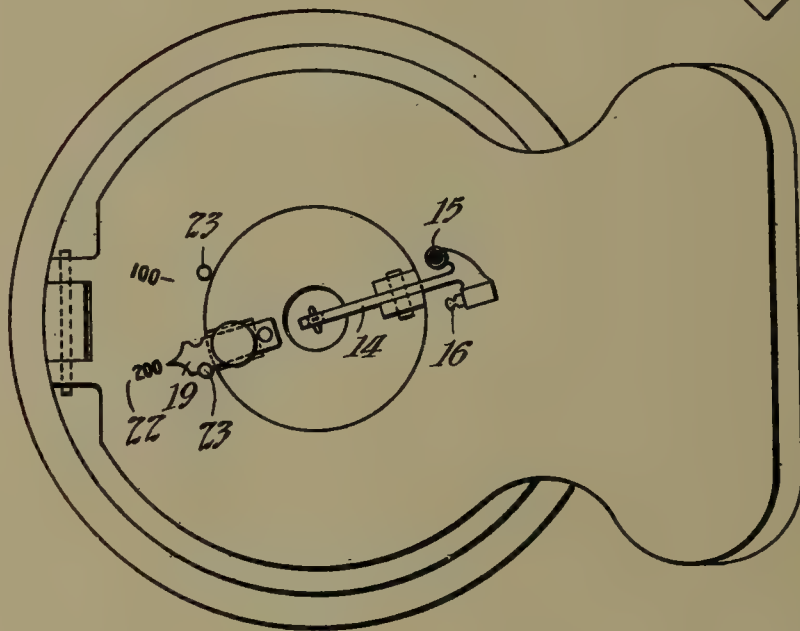


Fig. 2



Witnesses:

George R. Hull
Herbert H. Dyke

Inventors:

Frank L. Dyer
Frank A. Lewis
by Frank L. Dyer, Attorney

UNITED STATES PATENT OFFICE.

FRANK L. DYER, OF MONTCLAIR, AND FRANK D. LEWIS, OF ELIZABETH, NEW JERSEY,
ASSIGNORS TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A COR-
PORATION OF NEW JERSEY.

PHONOGRAPH-REPRODUCER.

No. 904,853.

Specification of Letters Patent.

Patented Nov. 24, 1908.

Application filed June 6, 1908. Serial No. 437,099.

To all whom it may concern:

Be it known that we, FRANK L. DYER, a citizen of the United States, residing at Montclair, in the county of Essex and State of New Jersey, and FRANK D. LEWIS, a citizen of the United States, and a resident of Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Phonograph-
Reproducers, of which the following is a description.

Our invention relates to phonograph reproducers and has for its object the production of a reproducer having two styluses carried by a single lever, said lever being pivoted to a support which is carried by a floating weight and capable of being moved with respect thereto so as to bring either of said styluses into and out of operative position with respect to the record surface, and said styluses being adapted to operate upon phonograph records of different pitch; for example, one stylus may be suitable for operating upon records having one hundred turns or threads per inch and the other stylus may be suitable for records having two hundred threads per inch. Indicating means are also provided for designating which of the styluses is in operative position.

In order that the invention may be more fully understood, reference is made to the accompanying drawing, of which

Figure 1 is a side elevation, partly in section, of a reproducer constructed in accordance with our invention, and Fig. 2 is a bottom plan view of the same.

The reproducer shown comprises a body 1, within which the diaphragm 2 is secured in the usual manner by the clamping ring 3, and the floating weight 4 is pivoted at 5 to the block 6 carried by the body 1. The floating weight 4 is formed with a central opening 7 and recess 8, within which is situated the stylus lever support which may be in the form of a flanged sleeve or bushing 9. The upper end of said bushing is threaded to receive the nut 10 which presses a spring washer or dished plate 11 against the upper surface of the floating weight, so as to hold the support 9 in frictional engagement with the said weight. The support 9 is formed with a pair of depending lugs 12 which receive the pin 13 upon which the stylus lever

14 is pivoted. Said lever 14 is shaped somewhat like the letter T and at the extremity of each end of the cross-arm is a socket in which are secured the styluses 15 and 16, the former being adapted to operate upon a record having two hundred threads per inch and the latter upon records having one hundred threads per inch. The opposite end of the lever 14 is connected to the link 17, the upper end of which is connected to the eye 18 secured to the center of the diaphragm 2.

There is an index finger or plate 19, which is provided at one end with a pin 20 engaging an opening in the support 9 and with a holding screw 21 passing through an opening in the plate 19 and is threaded in the flange of the bushing 9. The plate 19 coöperates with indicia 22 applied to the lower surface of the floating weight 4 to designate which of the styluses 15 and 16 is in operative position, and it also limits the angular movement of the bushing 9 by coöperation with the stop pins 23 which extend downward from the weight 4.

When the parts are in the position of Fig. 2, the stylus 15 is in operative position with respect to the record surface and the index finger 19 is opposite the numerals "200" indicating that the reproducer is in suitable position for operating upon records having two hundred threads per inch. In order to convert it into a reproducer suitable for records having one hundred threads per inch it is necessary only to move the bushing 9 into its other extreme position, at which time the finger 19 will be opposite the numerals "100".

Having now described our invention, what we claim is:

1. In a phonograph reproducer, the combination of the body and vibratory means carried thereby, the floating weight, a stylus lever support movable with respect to said weight, a stylus lever pivoted to said support and a pair of reproducer styluses of different diameters carried by said stylus lever, substantially as set forth.

2. In a phonograph reproducer, the combination of the body and vibratory means, the floating weight, a stylus lever support capable of angular adjustment with respect to said weight, a stylus lever pivoted to said

support and a pair of reproducer styluses of different diameters carried by said lever, substantially as set forth.

3. In a phonograph reproducer, the combination of the body and vibratory means, the floating weight, a stylus lever support capable of angular adjustment with respect to said weight, a stylus lever pivoted to said support and a pair of reproducer styluses of different diameters carried by said lever, said styluses being applied to the same end of said lever, the opposite end of said lever being connected to said vibratory means, substantially as set forth.

4. In a phonograph reproducer, the combination of the body and vibratory means carried thereby, the floating weight, a stylus lever support movable with respect to said weight, a stylus lever pivoted to said support, a pair of reproducer styluses of different diameters carried by said stylus lever, and indicating means for designating the operative positions of said styluses, substantially as set forth.

5. In a phonograph reproducer, the combination of the body and vibratory means, the floating weight, a stylus lever support capable of angular adjustment with respect to said weight, a stylus lever pivoted to said support, a pair of reproducer styluses of different diameters carried by said lever, said styluses being applied to the same end of said lever and the opposite end of said lever being connected to said vibratory means, and indicating means for designating the operative positions of said styluses, substantially as set forth.

6. In a phonograph reproducer, the combination of the floating weight, the fulcrum pivoted to said weight, and a stylus lever

provided with a plurality of styluses and pivoted to said fulcrum, substantially as set forth.

7. In a phonograph reproducer, the combination of the floating weight, a fulcrum carried by said weight, a stylus lever provided with a plurality of styluses and pivoted to said fulcrum, said fulcrum being pivotally mounted upon said weight and frictionally held thereto, substantially as set forth.

8. In a phonograph reproducer, the combination of the floating weight, a fulcrum pivoted to said weight, a stylus lever provided with a pair of styluses and pivoted to said fulcrum, and indicating means for designating both operative positions of said stylus lever, substantially as set forth.

9. In a phonograph reproducer, the combination of the body, floating weight, a support pivoted to said floating weight, a stylus lever pivoted to said support, and a pair of styluses carried by said lever, substantially as set forth.

10. In a phonograph reproducer, the combination of the body, floating weight, a support pivoted to said floating weight, a stylus lever pivoted to said support, a pair of styluses carried by said lever, and means for limiting the angular movement of said stylus lever support, substantially as set forth.

This specification signed and witnessed this 5th day of June, 1908.

FRANK L. DYER.
FRANK D. LEWIS.

Witnesses:

H. H. DYKE,
JOHN M. CANFIELD.

E. B. HYATT.
 AUTOMATIC STOP ATTACHMENT FOR PHONOGRAPHS.
 APPLICATION FILED AUG. 17, 1907.

904,875.

Patented Nov. 24, 1908.

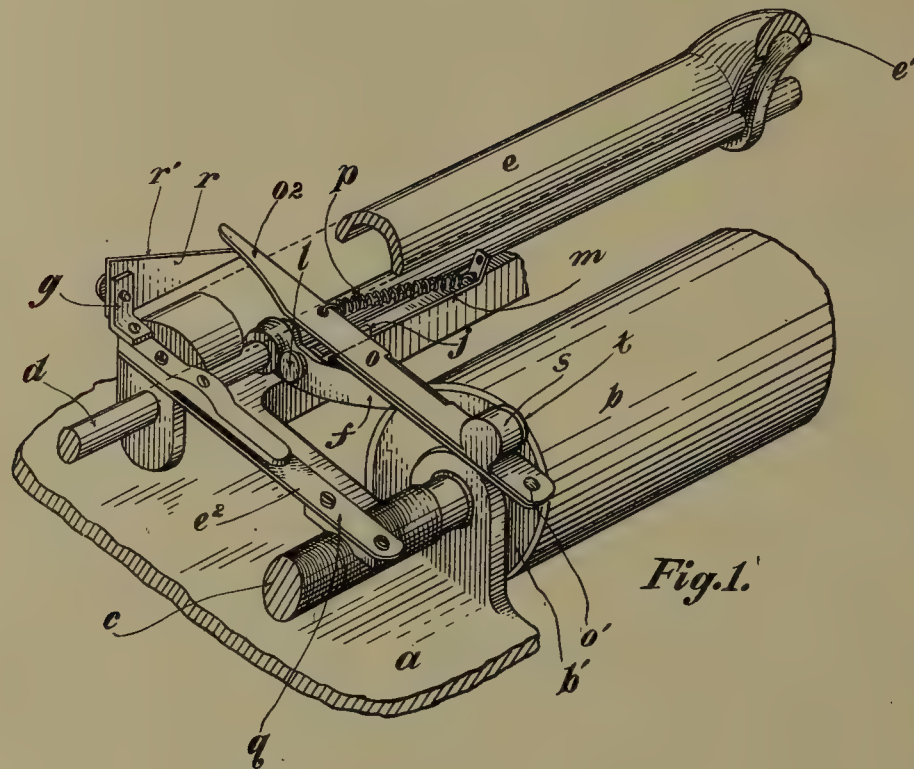


Fig. 1.

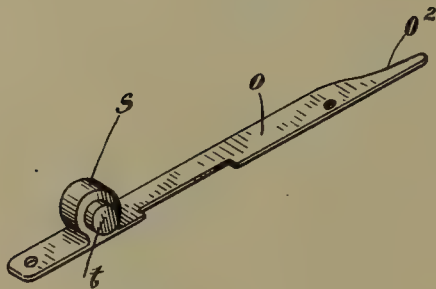


Fig. 2.

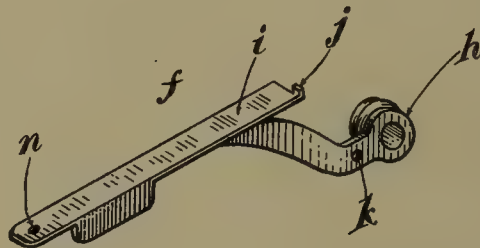


Fig. 3.

WITNESSES:
 Carlyle Geisler.
 H. S. Strong.

INVENTOR:
 Edgar B. Hyatt
 by *F. Geisler*
 ATT'Y.

UNITED STATES PATENT OFFICE.

EDGAR B. HYATT, OF PORTLAND, OREGON.

AUTOMATIC STOP ATTACHMENT FOR PHONOGRAPHS.

No. 904,875.

Specification of Letters Patent.

Patented Nov. 24, 1908.

Application filed August 17, 1907. Serial No. 389,067.

To all whom it may concern:

Be it known that I, EDGAR B. HYATT, a citizen of the United States, and a resident of the city of Portland, in the county of Multnomah and State of Oregon, have invented a new and useful Improvement in Automatic Stop Attachments for Phonographs, of which the following is a specification, reference being had to the accompanying drawings as constituting a part thereof.

This invention has for its object to provide simple means whereby the motor mechanism of a phonograph may be automatically stopped at the end of the selection being rendered. To this end my improvement essentially consists of a braking element arranged to engage with one end of the cylinder, and automatically thrown into action by contact devices carried by the carriage, arranged to act at the end of the selection being rendered. My stopping devices being furthermore so designed that they can be readily applied to any standard phonograph of the type in mind.

The details of the construction and mode of operation of my attachment are readily understood from an inspection of the drawings, in which.

Figure 1 shows a perspective detail of a phonograph with my attachment applied thereto as in practice; and Figs. 2 and 3 are details of construction of my attachment.

The letters designate the parts described. The parts of the phonograph not specifically described are understood to be of the usual standard make.

On the bed-plate *a* is journaled the usual record-cylinder *b*, the shaft of which has an extension *c*, made with an exterior thread and constituting the usual feed-shaft; the feed-shaft and therewith the cylinder, being rotated by the usual motor-mechanism of this class of phonographs which it is not necessary to illustrate. Arranged parallel to the feed-shaft *c* is a rigid shaft *d*, on which pivots and travels the carriage *e*. Such carriage being provided with an integral arm *e'* having on its extremity a diaphragm-head, which parts are supposed to be broken away from the sectional detail in Fig. 1. Part of the carriage *e*, as will be noted, is also broken away to avoid obscuring the attaching means of my device.

On the rigid shaft *d* is rigidly mounted an arm *f*, a detail of which is shown in Fig.

3. The same is provided with an eye *h*, through which to insert the shaft *d*; it is made goose-neck shaped, is provided with a flat surface *i*, and an upwardly projecting shoulder or stop-lug *j*. A perforation is provided at *k* through which to insert a set-screw *l*, by which is rigidly secured to the arm *f* a laterally projecting arm *m*, and at *n* is provided a perforation through which to insert a rivet *o'* whereby to pivotally secure a brake-lever *o*, the outer end of which arm is connected with the extremity of the arm *m* by a coil-spring *p*.

However, I do not confine myself to the details described; for example, the arm *m* could be made an integral part of the arm *f* if deemed more convenient.

q is the usual arm rigidly projecting from the carriage *e* and having at its extremity a nut engaging with the feed-shaft *c*. On the arm *q* is rigidly secured, by means of an angle-plate *g*, or otherwise, as is convenient, a plate *r*, having an inclined upper edge *r'*. The extremity *o'* of the lever *o* is tapered to facilitate its climbing up on the inclined edge *r'*. On the inner end of the lever *o* is provided a box *s*, in which is secured a disk of friction material *t*, the whole constituting a brake-shoe. It will be noted that all of the parts of my attachment may be readily affixed to the standard make of phonographs of the type illustrated.

The operation of my device is as follows: Normally the lever *o* will impinge upon and be held by the stop-lug *j*, thereby holding the brake-shoe *t* clear of the head *b'* of the cylinder *b*, and allowing the latter to be revolved by the motor-mechanism. Supposing the carriage *e* to be at the starting place of the phonograph, and to be traveling to the right, as usual in rendering a selection, towards the end of the selection the plate *r* would approach the tapering extremity of the lever *o* and finally engage therewith, lifting the same clear of the stop-lug *j* and thus allowing the coil-spring *p* to act, with the effect of causing the brake-shoe *t* to forcibly bear against the head-end *b'* of the cylinder *b*, and by so doing causing the consequent friction to resist and stop the motor-mechanism. Should it be desired to repeat the selection, or in case the cylinder has been supplied with a new record, the act of moving the carriage, by means of the usual arm *e'*, back to the starting place, will bring said

arm *e'* against the lever *o*, and return the same to its position in front of the stop-lug *j*; the lever *o* being caused to drop into place, in front of said stop-lug *j*, by reason of the
 5 far end of the coil-spring *p* being attached to the arm *m*, which is in a lower plane, and therefore causes such coil-spring *p* to exert a down pull.

I claim:

10 1. A phonograph stopping attachment comprising in combination with the record-cylinder, a carriage and supports therefor, a projecting piece on the carriage, a brake-element arranged to bear upon one end of the
 15 record-cylinder, means to normally hold the brake-element in inactive position, and a contact device, carried by the carriage, arranged to release said brake-element at the end of the selection rendered; said holding
 20 means for the brake being arranged to be thrown into action by contact therewith of said piece on the carriage by the act of returning the latter to its starting position.

25 2. A phonograph stopping attachment comprising in combination with the record-cylinder, a carriage and supports therefor, a projecting piece on the carriage, a supporting-bracket, a brake consisting of a lever pivoted on said bracket, extending horizon-
 30 tally transversely of the record-cylinder and the carriage, and a brake-shoe on said lever arranged to bear upon the end of the record-cylinder, a coil-spring arranged to operate the brake-lever to apply the brake-shoe, a
 35 stop to hold the brake-lever in inactive position, and a contact device, carried by the carriage, arranged to engage with the outer end of the brake-lever and disengage the same from the stop and allow the brake to be ap-
 40 plied at the end of the selection being rendered; said holding means for the brake being arranged to be thrown into action by contact therewith of said piece on the car-
 45 riage by the act of returning the latter to its starting position.

3. A phonograph stopping attachment comprising in combination with the record-cyl-
 50 nder, a carriage and supports therefor, a projecting arm on said carriage, a support-
 ing-bracket having a horizontal flat bearing-surface and a vertical stop-lug thereon, a brake-lever pivoted on the bearing-surface of the bracket, extending transversely of the record-cylinder and the carriage, and pro-
 55 vided with a brake-shoe arranged to bear on the end of the record-cylinder, a coil-spring arranged to operate the brake-lever to apply

the brake-shoe, one end of said coil-spring being attached below the plane of the bear-
 ing-surface of the bracket for the purpose 60
 specified, an inclined contact-plate carried on the carriage and arranged to engage with the outer end of said brake-lever to lift the
 same clear of the stop-lug and allow the 65
 brake to be applied at the end of the selec-
 tion being rendered, and the parts being ar-
 ranged to cause the projecting arm of the carriage to engage with the outer end of the
 brake-lever to return the same in front of
 said stop-lug by the act of returning the car- 70
 riage to its starting position.

4. A phonograph stopping attachment comprising in combination with the record-cylinder, a carriage and supports therefor, a
 75 projecting arm on said carriage, a support-
 ing-bracket having a horizontal flat bearing-surface and a vertical stop-lug thereon, a brake-lever pivoted on the bearing-surface of the bracket, extending transversely of the record-cylinder and the carriage, the outer 80
 end thereof made tapering and the inner end provided with a brake-shoe arranged to bear on the end of the record-cylinder, a coil-spring arranged to operate the brake-lever to apply the brake-shoe, one end of said coil- 85
 spring being attached below the plane of the bearing-surface of the bracket for the purpose specified, an inclined contact-plate carried on the carriage and arranged to engage with the outer tapering end of said brake- 90
 lever to lift the same clear of the stop-lug and allow the brake to be applied at the end of the selection being rendered, and the parts being arranged to cause the projecting arm of the carriage to engage with the outer end 95
 of the brake-lever to return the same in front of said stop-lug by the act of returning the carriage to its starting position.

5. In a talking machine the combination with a mandrel and the diaphragm carrying 100
 element, of a brake pivotally supported at the end of the mandrel and adapted to stop the machine by engaging both the diaphragm carrying element and the mandrel.

6. In a talking machine the combination 105
 with a mandrel and the diaphragm carrying element, of a brake pivotally supported at the end of the mandrel and adapted to be actuated by the diaphragm carrying element to engage and stop the mandrel.

EDGAR B. HYATT.

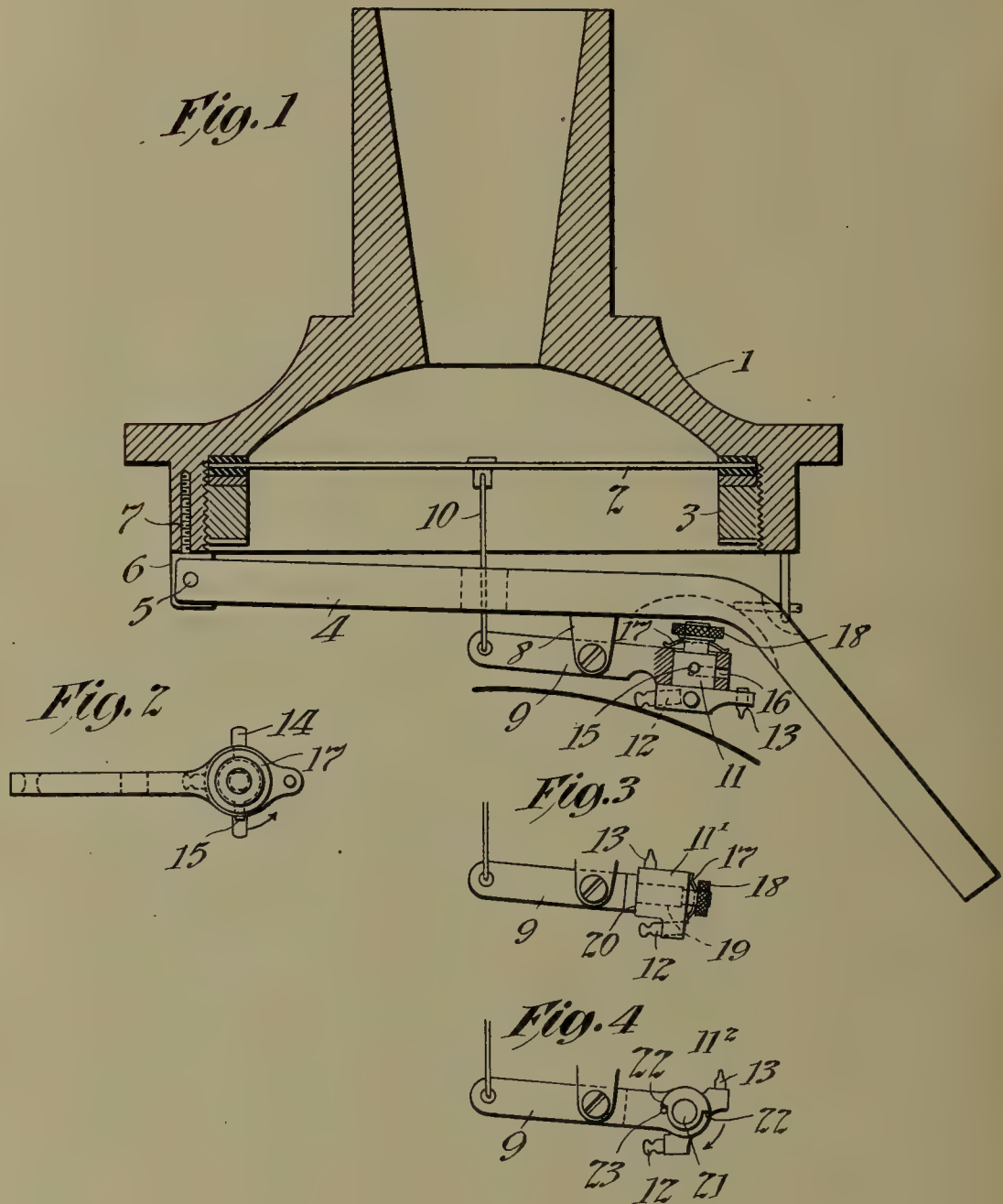
Witnesses:

T. J. GEISLER,
 A. D. GERKING.

F. D. LEWIS.
 PHONOGRAPH REPRODUCER.
 APPLICATION FILED APR. 15, 1908.

904,884.

Patented Nov. 24, 1908.



Witnesses:

Delos Holden
Anna R. Kuhn

Inventor:
Frank D. Lewis

by Frank L. Roper
Atty.

UNITED STATES PATENT OFFICE.

FRANK D. LEWIS, OF ELIZABETH, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH-REPRODUCER.

No. 904,884.

Specification of Letters Patent.

Patented Nov. 24, 1908.

Application filed April 15, 1908. Serial No. 427,224.

To all whom it may concern:

Be it known that I, FRANK D. LEWIS, a citizen of the United States, and a resident of Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Phonograph-Reproducers, of which the following is a description.

My invention relates to phonograph reproducers which are provided with a pair of reproducing styluses adapted to track records of different pitch, as, for example, records of one-hundred and two-hundred threads per inch respectively, said styluses being mounted in a support which may be moved or shifted so as to bring either of said styluses into and out of operative position with respect to the record surface as desired. Such a reproducer is disclosed and broadly claimed in an application filed by Peter Weber, March 26, 1908, Serial No. 423,383, wherein it is proposed to mount styluses of this character upon separate levers which are separately pivoted to a support which is rotatably mounted upon the floating weight of the reproducer.

According to the present invention, only one stylus lever is used and the same is pivoted directly to the floating weight in the usual manner, and a support for both styluses is movably mounted on or carried by one end of said lever.

In order that the invention may be more fully understood, reference is hereby made to the accompanying drawing of which

Figure 1 is a side elevation, partly in section, of a phonograph reproducer constructed in accordance with my invention; Fig. 2 is a plan view of the stylus lever of Fig. 1, and Figs. 3 and 4 are side elevations of modified forms of stylus lever and stylus support.

The reproducer shown comprises the usual sound box body 1 and diaphragm 2 clamped therein by the ring 3, the floating weight 4 being pivoted at 5 to the block 6 which is supported by the engagement of the screw 7 with the body 1. There are one or more lugs 8 depending from the weight 4 and the stylus lever 9 is pivoted at or near its center to said lugs. One end of said lever 9 is connected by a link 10 to the center of the diaphragm; the other end of the lever 9 is enlarged and a stylus holder 11 is rotatably

mounted in a circular opening formed therein. The lower portion of the holder 11 is formed with a pair of sockets, one of which receives a stylus 12 suitable for operating upon an ordinary record of one-hundred threads per inch, and the other socket receives a stylus 13 adapted to operate upon a record having two-hundred threads per inch.

There is a pin 14 extending transversely through the stylus holder to enable the same to be readily turned through an angle of 180°, the movement of the holder in each direction being limited by the engagement of a stop pin 15 with the body of the lever, the end of the lever being slotted as shown at 16 to allow a movement of the stop through an angle of 180°. The stylus support is held in each of its operative positions by frictional engagement with the stylus lever which is produced by the action of a spring washer 17 which surrounds the reduced upper end of the stylus holder and bears against the stylus lever and a nut or head 18 secured to the said reduced end.

In the device of Fig. 3, the end of the lever 9 is reduced to form a stud 19 and the stylus holder 11' is rotatable upon said stud, being held in frictional engagement with the shoulder 20 of the lever 9 by the spring washer 17 and nut 18 threaded on the end of the stud 19.

In Fig. 4, the stylus holder 11² is mounted upon a stud 21 extending transversely with respect to the lever 9 and is rotatable thereon through an angle of 180°, its extreme positions being determined by the engagement of shoulders 22, formed on the stylus holder, with the stop 23 carried by the lever 9.

It will be noted that in all of the structures shown a simple rotary movement of the stylus holder through an angle of 180°, will convert the reproducer from an instrument suitable for operating upon records having one-hundred threads per inch to one for operating upon a two-hundred thread record and vice versa.

Having now described my invention, what I claim is:

1. In a phonograph reproducer, the combination of the diaphragm and floating weight, a lever pivoted to said weight and connected to said diaphragm, and a stylus holder provided with a pair of styluses and carried by said lever, said stylus holder be-

ing movable so as to bring either of said styluses into and out of operative position with respect to the record surface, substantially as set forth.

5 2. In a phonograph reproducer, the combination of the floating weight, diaphragm, stylus lever pivoted to said weight and connected to said diaphragm, and a stylus holder
10 provided with a plurality of styluses and rotatably mounted upon said lever, substantially as set forth.

3. In a phonograph reproducer, the combination of the floating weight, diaphragm, stylus lever pivoted to said weight and connected to said diaphragm, and a stylus
15 holder provided with a plurality of styluses, rotatably mounted upon said lever and fric-

tionally held thereto, substantially as set forth.

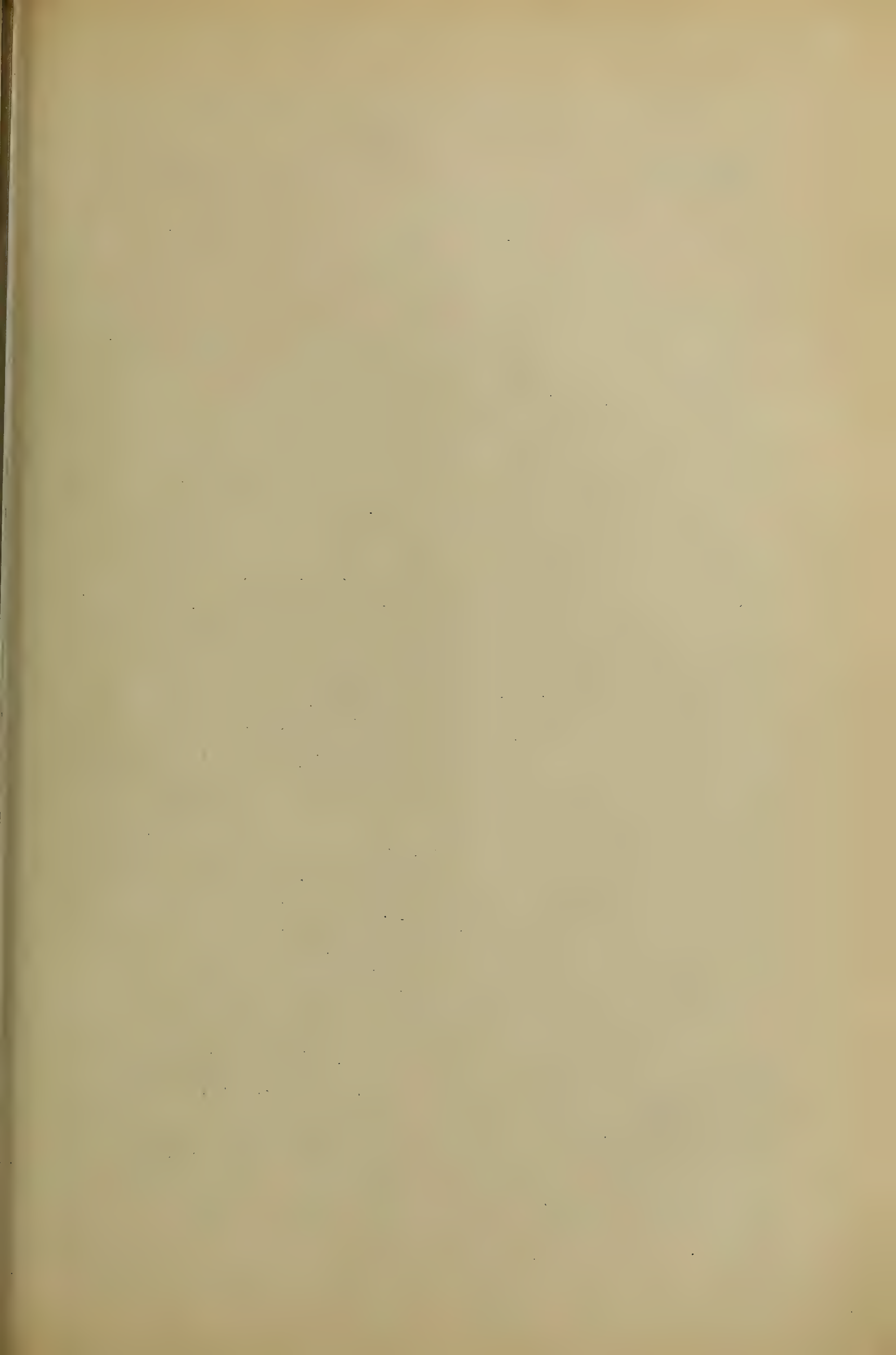
4. In a phonograph reproducer, the combination of the floating weight, diaphragm, stylus lever pivoted to said weight and connected to said diaphragm, a stylus holder
20 provided with a plurality of styluses and rotatably mounted upon said stylus, and
25 means for limiting the angular movement of said stylus holder in both directions, substantially as set forth.

This specification signed and witnessed this 13th day of April 1908.

FRANK D. LEWIS.

Witnesses:

DELOS HOLDEN,
ANNA R. KLEHM.



D. HOLDEN.
 PHONOGRAPH REPRODUCER.
 APPLICATION FILED JULY 10, 1908.

904,959.

Patented Nov. 24, 1908.

Fig. 1

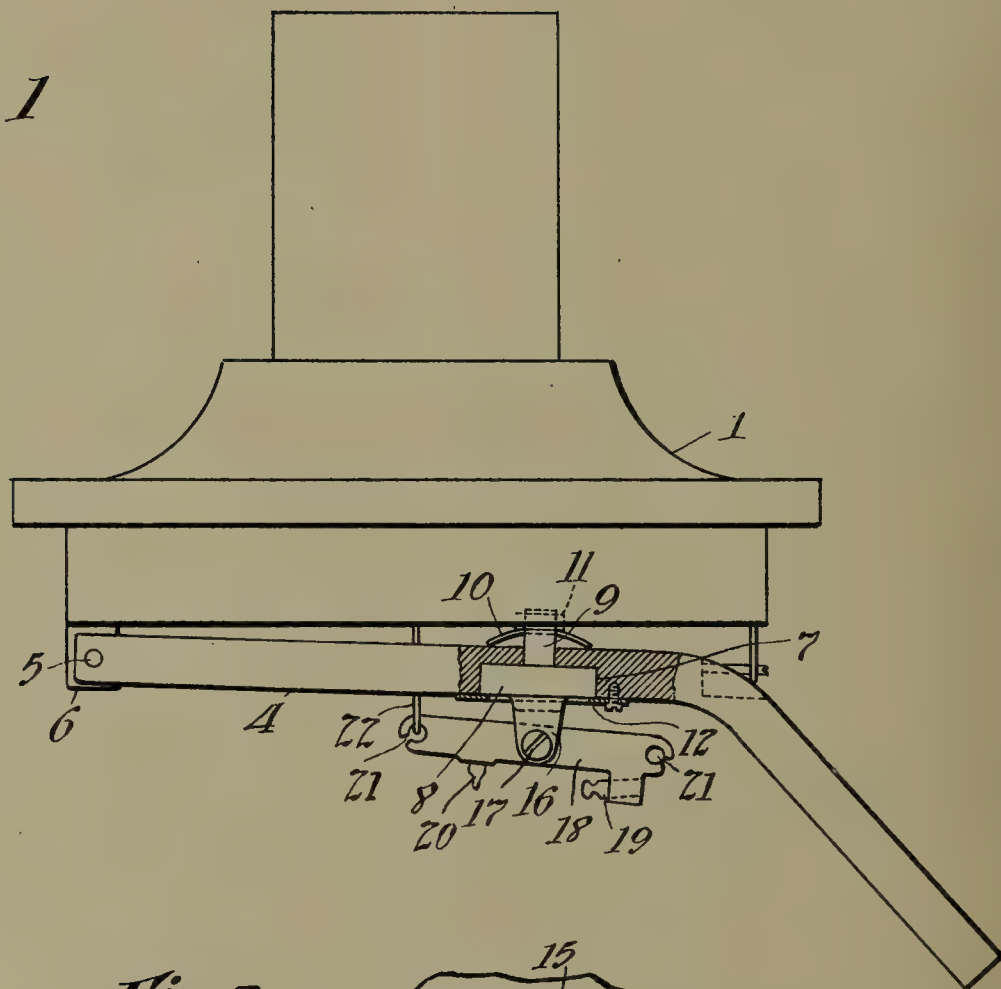
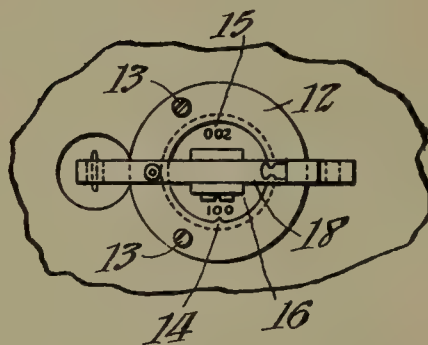


Fig. 2



Witnesses:
 Frank D. Lewis
 John W. Canfield

Inventor:
 Delos Holden
 by Frank L. Wyer
 Atty.

UNITED STATES PATENT OFFICE.

DELOS HOLDEN, OF UPPER MONTCLAIR, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH-REPRODUCER.

No. 904,959.

Specification of Letters Patent.

Patented Nov. 24, 1908.

Application filed July 10, 1908. Serial No. 442,978.

To all whom it may concern:

Be it known that I, DELOS HOLDEN, a citizen of the United States, and a resident of Upper Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonograph-Reproducers, of which the following is a description.

My invention relates to phonograph reproducers which are provided with a pair of reproducing styluses adapted to track records of different pitch, as, for example, records of one-hundred and two-hundred threads per inch respectively, said styluses being mounted in a support which may be moved or shifted so as to bring either of said styluses into and out of operative position with respect to the record surface as desired. Such a reproducer is disclosed and broadly claimed in an application filed by Peter Weber, March 26, 1908, Serial No. 423,383, wherein it is proposed to mount styluses of this character upon separate levers which are separately pivoted to a support which is rotatably mounted upon the floating weight of the reproducer.

According to the present invention, only one stylus lever is used, and the same is pivoted on a horizontal axis to a fulcrum which latter is pivoted on a vertical axis to the floating weight and both styluses are carried by said lever, being preferably mounted on points at opposite sides of the fulcrum and equidistant therefrom.

In order that the invention may be more fully understood, reference is hereby made to the accompanying drawing of which Figure 1 is a side elevation, partly in section, of a phonograph reproducer constructed in accordance with my invention, and Fig. 2 is a bottom plan view of the stylus lever, fulcrumal support therefor and adjacent portion of the floating weight.

The reproducer shown comprises the usual sound box body 1 within which the diaphragm is clamped, the floating weight 4 being pivoted at 5 to the block 6 carried by the body 1, and movable on a vertical axis with respect thereto. The weight 4 is formed with a recess 7, and within the same is a circular block 8 having an integral stud 9 surrounding which is a spring washer 10 adapted to be compressed by the nut 11, threaded

on said stud so as to draw said block 8 into frictional engagement with the floating weight, said block being retained in position by an annular plate 12 secured by screws 13 threaded in the floating weight. The plate 12 is formed with an index finger 14 adapted to cooperate with indicating numerals 15 applied to the block 8, to designate which of the styluses is in operative position with respect to the record surface, or in other words whether the reproducer is in adjustment for operating upon records having one hundred or two hundred threads per inch.

There is a pair of lugs 16 depending from the block 8 which receive the horizontal screw 17 upon which the stylus lever 18 is pivotally mounted. The said lever is provided with a stylus 19 suitable for operating upon records having one hundred threads per inch and a stylus 20 suitable for operating upon records having two hundred threads per inch, said styluses being on opposite sides of the axis or fulcrum of the said lever and equidistant therefrom. Each end of the lever 18 is formed with a notched opening 21 adapted to receive the eye formed in the end of the link 22, the upper end of which is connected to the diaphragm.

In the position shown in the drawing, the stylus 19 is in proper position for operating upon a phonograph record. In order to bring the stylus 20 into operative position, the end of the link 22 is removed from the notch 21 of the lever 18, and the block 8 is rotated through an angle of 180°, bringing the other notch 21 into proximity to the link 22, which is then engaged with the same. In this position the indicating numerals 200 will be opposite the pointer 14.

Having now described my invention what I claim is:

1. In a phonograph reproducer, the combination of the diaphragm and floating weight, a fulcrum pivoted to said weight, a lever pivoted to said fulcrum, a pair of styluses carried by said lever and means for interchangeably connecting said lever with said diaphragm at points at opposite sides of its pivot or fulcrum, substantially as set forth.

2. In a phonograph reproducer, the combination of the floating weight, the fulcrum pivoted to said weight, and a stylus lever

provided with a pair of styluses and pivoted to said fulcrum at a point between the styluses, substantially as set forth.

3. In a phonograph reproducer, the combination of the floating weight, fulcrum carried by said weight, and stylus lever provided with a pair of styluses and pivoted to said fulcrum at a point between the styluses, said fulcrum being rotatably mounted upon said weight and frictionally held thereto, substantially as set forth.

4. In a phonograph reproducer, the combination of the floating weight, fulcrum pivoted to said weight, stylus lever provided with a pair of styluses, and pivoted to said fulcrum at a point between the styluses, and

indicating means for designating both operative positions of said stylus lever, substantially as set forth.

5. In a phonograph reproducer, the combination of the floating weight, the fulcrum pivoted to said weight, and a stylus lever provided with a pair of styluses pivoted to said fulcrum at a point substantially in a line with the axis upon which said fulcrum turns, substantially as set forth.

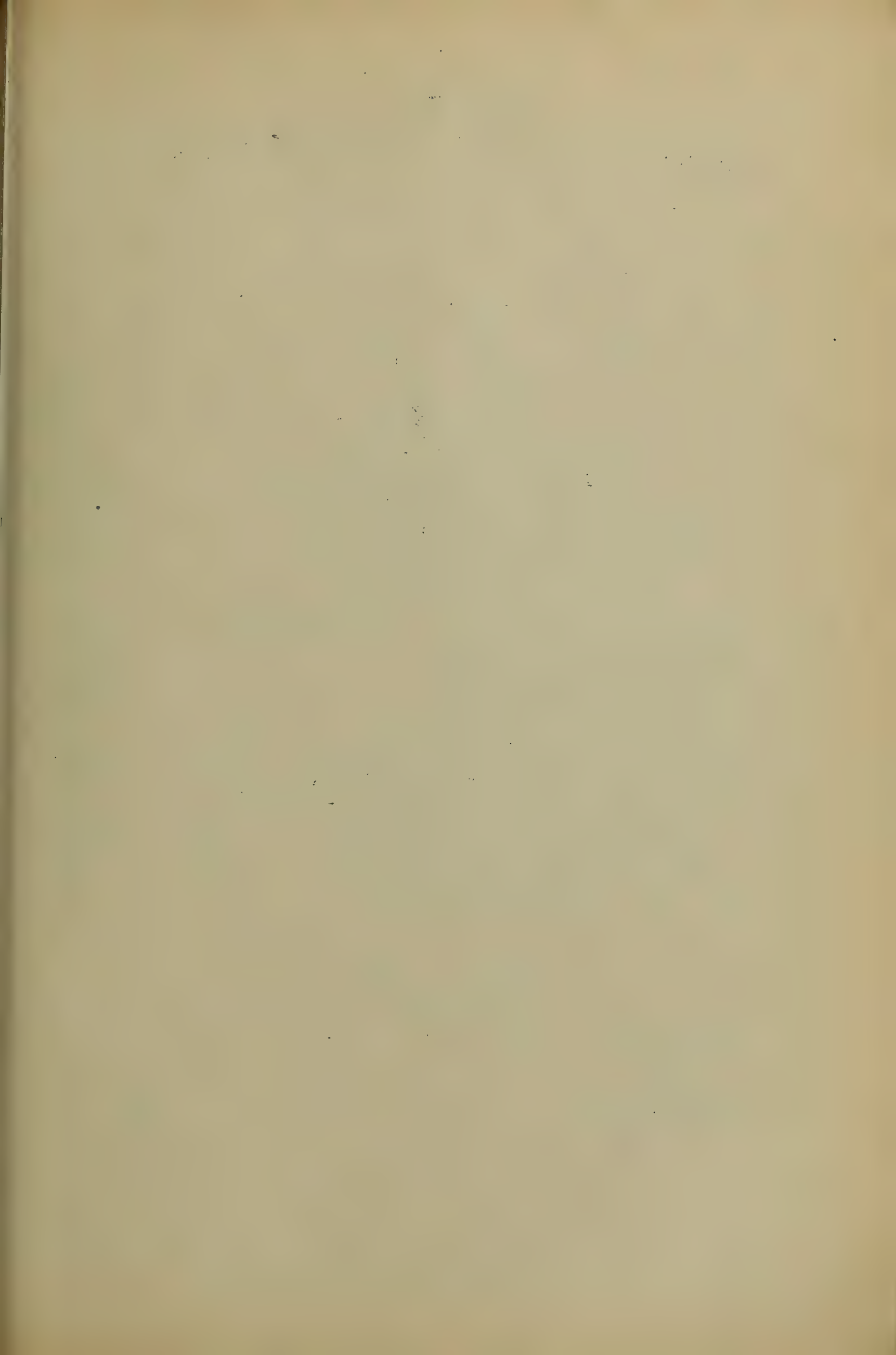
This specification signed and witnessed this 8th day of July 1908.

DELOS HOLDEN.

Witnesses:

FRANK D. LEWIS,

H. R. KLEHM.



905,033.

Patented Nov. 24, 1908.

Fig. 2

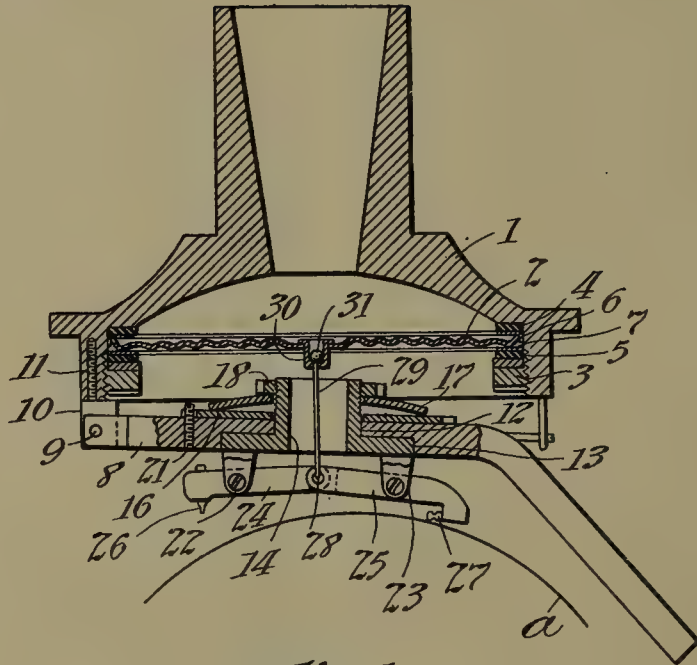


Fig. 3

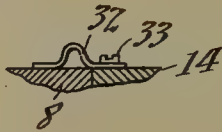
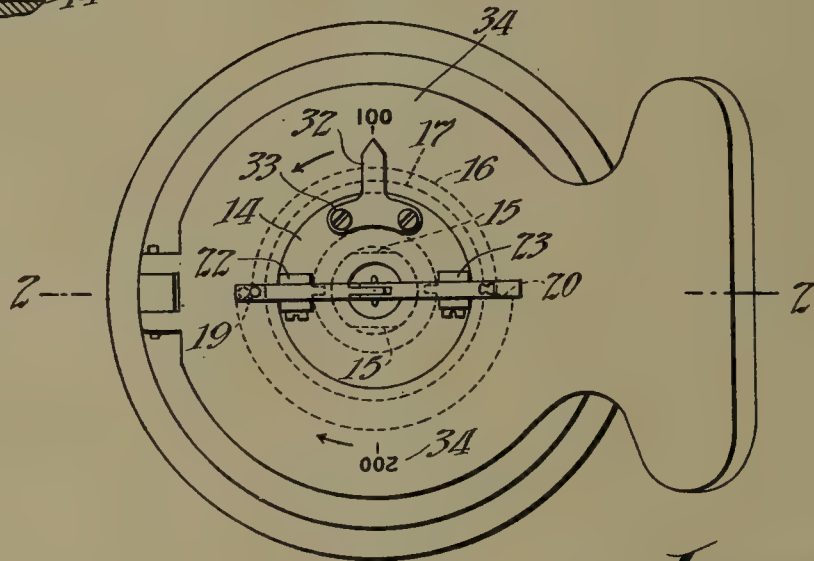


Fig. 1



Witnesses:
 Frank W Lewis
 Albert A Dyke

Inventor:
 Peter Weber
 by Frank L. Dyer
 Atty.

UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY,
OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH-REPRODUCER.

No. 905,033.

Specification of Letters Patent.

Patented Nov. 24, 1908.

Application filed March 26, 1908. Serial No. 423,383.

To all whom it may concern:

Be it known that I, PETER WEBER, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonograph-Reproducers, of which the following is a description.

My invention relates to phonograph reproducers and has for its object the production of a reproducer having two styluses, preferably carried by levers which are pivoted to a floating weight and said styluses being adapted to operate upon phonograph records of different pitch, for instance, one stylus may be suitable for records having one-hundred turns or threads per inch and the other stylus suitable for records having two-hundred threads per inch, both of said styluses, however, being connected to and adapted to impart vibrations to the same diaphragm.

In order that the invention may be more fully understood, reference is made to the accompanying drawing of which—

Figure 1 is a bottom plan view of a phonograph reproducer constructed in accordance with my invention; Fig. 2 is a section on line 2—2 of Fig. 1; and Fig. 3 is a detail view, partly in section, showing the index finger for indicating which of the styluses is in operative position.

The reproducer shown comprises a body 1 within which the diaphragm 2 is secured by the clamping rings 3, 4 and 5 representing metallic rings or gaskets, and 6 and 7 paper washers. The floating weight 8 is pivoted at 9 to the lug 10 which is secured to the lower end of the screw 11, threaded in the body 1. The floating weight 8 is formed with a central opening 12 and recess 13 within which is situated the stylus carrying flanged sleeve or bushing 14. The exterior of said bushing is formed with a pair of flat surfaces 15, and a plate 16, having a central opening adapted to fit upon the bushing is placed thereon, after which a spring washer or dished spring plate 17 is placed upon the bushing and a clamping nut 18 is screwed upon the end thereof, so as to secure the bushing in position. The bushing is rotatable with respect to the weight 8, being held in position by frictional engagement therewith and its angular movement in each direction is limited by the shoulders 19 and

20 formed on said plate 16 in position to engage a stop which is in the form of a screw 21 threaded in the weight 8. Depending from the lower surface of the bushing 14 are pairs of lugs 22 and 23 respectively, to which are pivoted the stylus levers 24 and 25. The outer end of the lever 24 is provided with a stylus 26 of proper form and size for operating upon a sound record having two hundred threads per inch, and the outer end of the lever 25 is provided with a stylus 27 suitable for operating upon a sound record having one-hundred threads per inch. The inner end of the lever 25 is forked and receives the reduced end of the lever 24, and there is an eye or opening 28 formed in each of said levers through which passes the lower end of a link 29. The upper end of said link passes through the bottom of a cup 30 which is secured to the center of the diaphragm, and a ball 31 is secured to or formed upon the end of the link so as to form with said cup a swivel or ball and socket joint, which permits the rotation of the bushing 14 without affecting the connection of the stylus levers with the diaphragm.

There is an index finger or pointer 32 secured to the lower surface of the bushing 14 by screws 33, the point of which extends in proximity to the surface of the floating weight 8, and upon the latter are placed indicating figures 34, whereby the pointer 32 designates which of the styluses is in proper position for operating upon a record surface; thus, if the pointer is opposite the figures 100, as shown in Fig. 1, the stylus 27 is in proper position for operating on record *a*, and when the sleeve 14 is rotated through an angle of 180° the stylus 26 will be in operative position and the pointer 32 will be opposite the figures 200.

Having now described my invention, what I claim is:

1. In a phonograph reproducer, the combination of the body, a floating weight pivoted to said body and a pair of styluses carried by said floating weight, each of which is movable independently of said weight into and out of operative position with respect to the record surface, substantially as set forth.

2. In a phonograph reproducer, the combination of the diaphragm, floating weight and a pair of styluses carried by said weight and connected to said diaphragm, each of

said styluses having an angular movement independently of said weight into and out of operative position with respect to the record surface, substantially as set forth.

5 3. In a phonograph reproducer, the combination with the body, floating weight and stylus carrier pivoted to said floating weight, of a pair of styluses carried thereby and movable into and out of operative position
10 with respect to the record surface, substantially as set forth.

4. In a phonograph reproducer, the combination with the diaphragm and floating weight, of a pair of stylus levers connected
15 to said diaphragm and pivoted upon a support rotatable upon said floating weight, substantially as set forth.

5. In a phonograph reproducer, the combination of a body, floating weight, a support mounted on said floating weight, stylus
20 levers connected to said diaphragm and pivoted to said support, said support being movable with respect to said floating weight, whereby either of said styluses may be
25 brought into and out of operative position with respect to the record surface, substantially as set forth.

6. In a phonograph reproducer, the combination of the floating weight, the spring
30 washer 17, the flanged bushing passing through said weight, means for compressing said spring washer and clamping said bushing and weight together, a pair of stylus levers pivoted to said bushing and a link
35 connected to said levers and passing through the bore of said bushing, substantially as set forth.

7. In a phonograph reproducer, the combination of the diaphragm, floating weight,
40 bushing 14, stylus levers pivoted thereto, a link 29 passing through the bore of said bushing, and a swivel connection between said link and said diaphragm, substantially as set forth.

8. In a phonograph reproducer, the combination of the diaphragm, the cup 30 secured thereto, the link 29 having a ball 31 within said cup, a stylus lever connected to the other end of the said link, a support for
50 said stylus lever, and a floating weight, said support being rotatable with respect to the floating weight, substantially as set forth.

9. In a phonograph reproducer, the combination with the body, diaphragm, and floating weight, of a pair of styluses of different
55 diameters carried by said weight and connected to said diaphragm, substantially as set forth.

10. In a phonograph reproducer, the combination with the body, diaphragm, and
60 floating weight, of a pair of styluses of different diameters carried by said weight and connected to said diaphragm, and means for imparting an angular movement to the styluses to bring either one into and out of
65 operative position with respect to the record surface, substantially as set forth.

11. In a phonograph reproducer, the combination of the body, diaphragm and floating weight, of a stylus carrier pivoted to said
70 weight on an axis substantially in alinement with the center of the diaphragm, substantially as set forth.

12. In a phonograph reproducer, the combination of the body, diaphragm and floating weight, of a sleeve carried by and rotatable
75 with respect to said weight, a stylus lever pivoted to said sleeve and a link passing through said sleeve and connecting said diaphragm and said stylus lever, substantially as set forth.
80

This specification signed and witnessed this 24 day of March 1908.

PETER WEBER.

Witnesses:

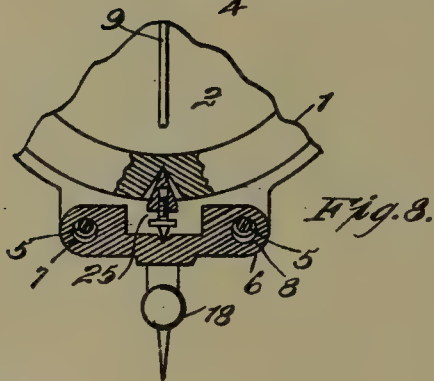
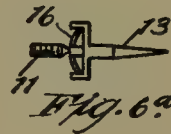
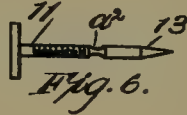
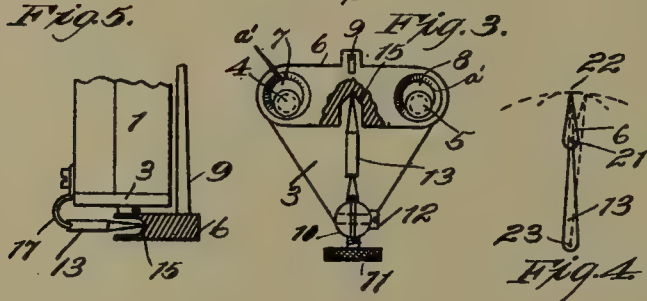
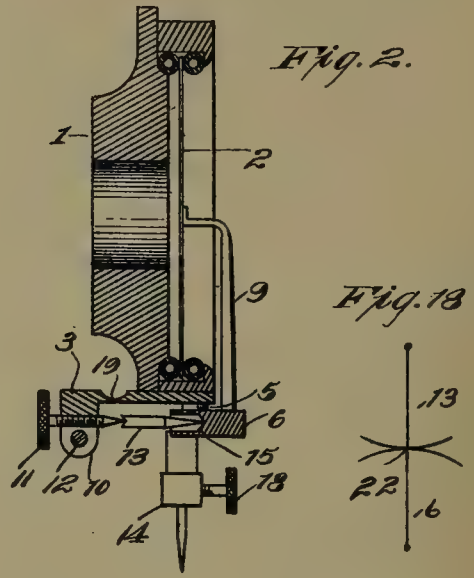
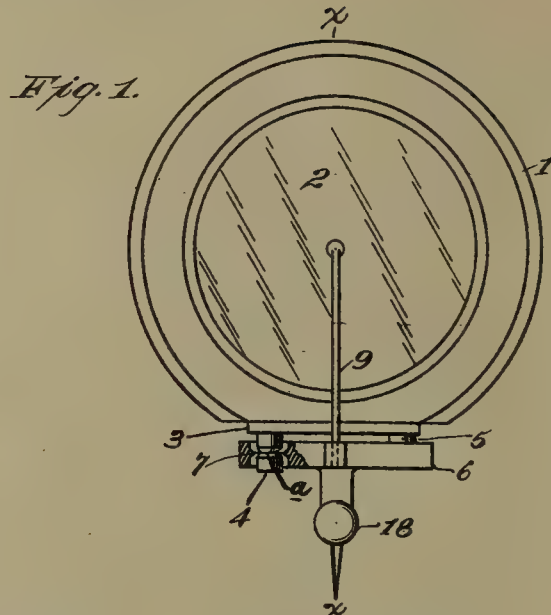
FRANK D. LEWIS,
H. H. DYKE.

A. JUNOD.
TALKING MACHINE SOUND BOX.
APPLICATION FILED FEB. 27, 1908.

905,082.

Patented Nov. 24, 1908.

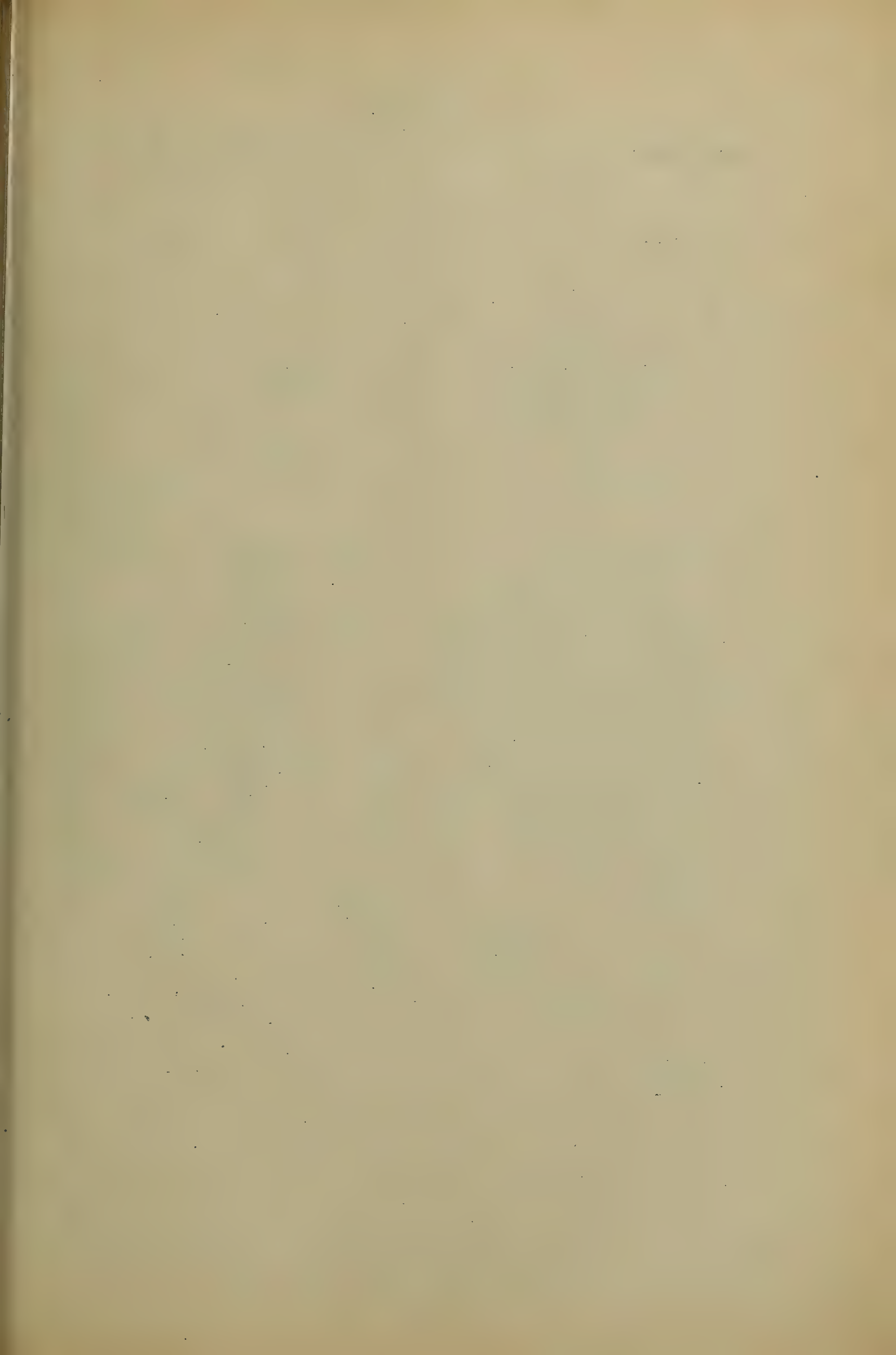
2 SHEETS—SHEET 1.



WITNESSES

E. C. Maynard.
Witness

INVENTOR
André Junod
BY *Geo. H. Strong.*
ATTORNEY



905,082.

Patented Nov. 24, 1908.

2 SHEETS—SHEET 2.

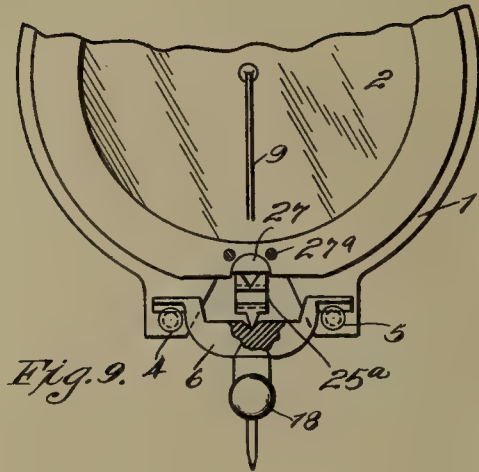


Fig. 9.

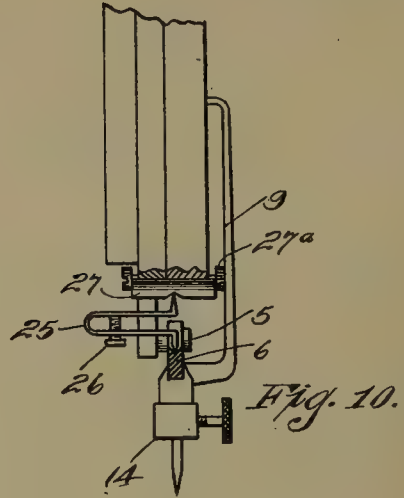


Fig. 10.

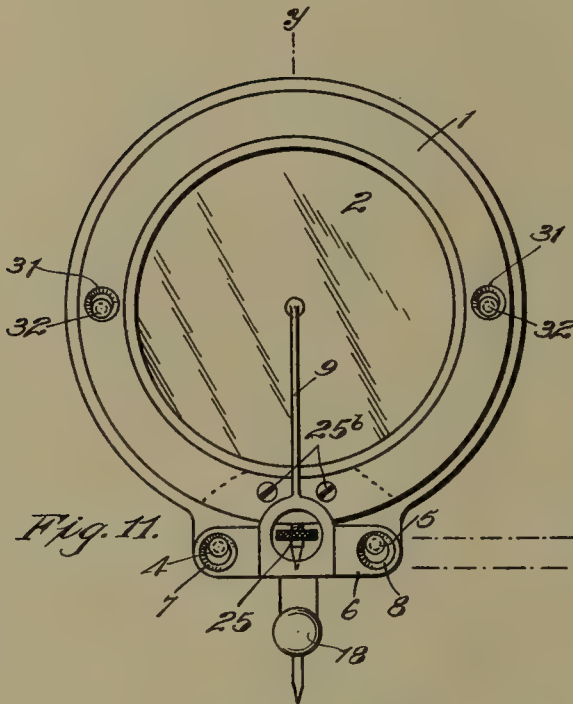


Fig. 11.

Fig. 13.

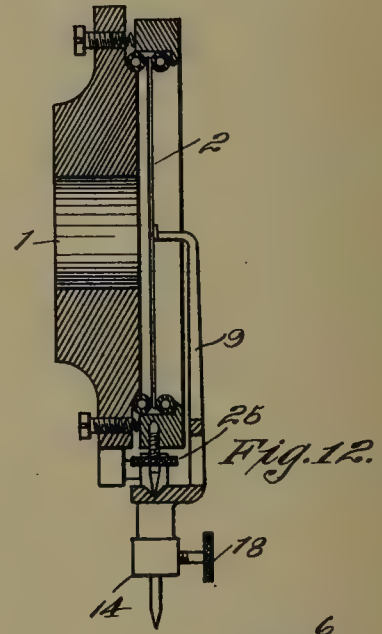


Fig. 12.

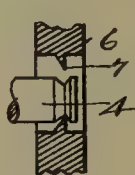


Fig. 14.

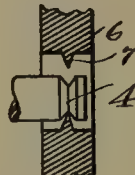


Fig. 15.

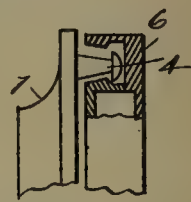


Fig. 16.

WITNESSES

A. E. Maynard.
J. E. Strong

INVENTOR;
André Junod :

BY *Geo. H. Strong.*
ATTORNEY

UNITED STATES PATENT OFFICE.

ANDRÉ JUNOD, OF FRUITVALE, CALIFORNIA.

TALKING-MACHINE SOUND-BOX.

No. 905,082.

Specification of Letters Patent.

Patented Nov. 24, 1908.

Application filed February 27, 1908. Serial No. 418,070.

To all whom it may concern:

Be it known that I, ANDRÉ JUNOD, citizen of the United States, residing at Fruitvale, in the county of Alameda and State of California, have invented new and useful Improvements in Talking-Machine Sound-Boxes, of which the following is a specification.

My invention relates to sound-boxes for talking machines and especially to novel means for mounting the stylus bar of such a sound-box in such a manner as to make the apparatus extremely sensitive, and to accurately reproduce the recorded vibrations.

It consists in the combination of parts, and in details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a plan view of the reproducer. Fig. 2 is a vertical section of the same, taken through $x-x$ of Fig. 1. Fig. 3 is a view looking toward the side of the apparatus in line with the stylus bar. Fig. 4 is a diagrammatic view showing the position of the pins and their combination. Figs. 5, 6 and 6^a are modifications of the tensioning means. Fig. 7 is a section transverse to the groove of one of the bearing studs. Fig. 8 is a sectional view through the bearing points. Fig. 9 is a similar view showing straight knife edges, and a U-shaped spring. Fig. 10 is a sectional elevation of the same through the center of the reproducer. Fig. 11 is a plan view showing the sound-box ring used as a tension lever. Fig. 12 is a sectional elevation of the same on lines $y-y$ of Fig. 11. Fig. 13 is a diagrammatic view of the stylus bar. Figs. 14, 15, 16 and 17 are views showing modified forms of bearings for the ring.

Various devices have been made in connection with this class of apparatus for the proper tensioning of the stylus-bar, and to provide a construction which will prevent secondary vibrations; and it is the object of my invention to provide a compact construction to employ substantially rigid tensioning devices which are not subject to give way under pressure, or become loosened so as to put the stylus bar out of operation.

In my construction, the tensioning or engagement point on the stylus bar, is located at one side of the fulcrum, and the stationary point upon the opposite side.

Referring to Fig. 1, 1 is a sound-box casing in which the diaphragm 2 is clamped. The plate 3 secured to the casing 1 is pro-

vided with bearing-studs 4 and 5 having on their cylindrical surfaces V-shaped grooves a which serve as bearings for the circular knife edges a' formed in the holes 7 and 8, of the transverse bar 6, as shown in Fig. 3. The stylus bar 9 is connected with the center of the diaphragm 2 in the usual or any suitable method, and the needle or stylus is clamped to the outer end of the bar by means of a thumb screw 18 in the boss 14 of the transverse bar 6. The diameter of the circular knife edges a' and a' of the bar 6 is slightly larger than the diameter of the studs 4 and 5, so that the bar can be easily removed from its bearings. The transverse bar 6 is provided in its center, and in the same plane with the knife edges a' and a' with a conical recess 15, located on the rear and outside the bearing points of the knife edges a' and a' and the studs 4 and 5, as plainly shown in Fig. 3. The compression pin 13 is pressed or forced against the bottom of the recess 15, by means of an adjusting-screw 11, and this is retained in position by means of a set screw 12 adjusted in the split stud 10 of the plate 3. There are no springs provided in this construction as it is intended that the mounting of the stylus bar and adjusting screw, and the studs 4, 5 and 10 on the thin plate 3, will be sufficiently yielding to assure an accurate adjustment for an indefinite length of time. The plate 3 may preferably be made thinner at an intermediate portion, as plainly shown at 19 Fig. 2, and this will increase the yielding effect.

In Fig. 5 I have shown a spring 17 which may be used in place of the stud 10 and adjusting screw 11. This spring is simply screwed on the side of the sound-box casing, and its projecting end bears upon the compression pin 13.

In Fig. 6 I have shown the adjusting screw 11, and the compression pin 13 made in a single piece, and made elastic at the point a^2 .

In Fig. 6^a I have shown the parts 11 and 13 made separate and connected by means of a small star or other shaped spring 16; these modifications all serving to produce the required elasticity. The relative position of the pins 13, and the lever formed by the transverse bar 6 are plainly shown in Fig. 4, in which 21 is the fulcrum or bearing point of the stylus bar. 22 is the compression or tension point of the two combined

elements 6 and 13; this tension point being located on one side of the fulcrum of the bar, and the stationary point 23 upon the other side of the fulcrum 21. The arc described by the pin 13 tilting about the fixed point 23 being of larger radius than the arc described by the lever or stylus bar 6 tilting on the other fixed point 21, and the two parts being connected at the point 22, it will be evident that by each half oscillation of the stylus bar or lever 6, there will be a pressure exerted on the point 23, and the two parts will have a tendency to come into a position in which the three points 21, 22 and 23 will lie in a straight line; and an elastic mounting for each half oscillation of the diaphragm is thus provided.

In Fig. 17 I have shown in a diagrammatic view a further illustration of the operation of this device. Supposing the stylus bar lever 6 and the compression or tension pin 13 to be of the same length, the stationary point 23, and the fulcrum point 21 will coincide, and the arcs described by the movement of the two parts will also coincide, so that there will be no tension at all on the diaphragm for each half oscillation. This differs from devices in which the tension points are both on the same side of the fulcrum, since in that case the oscillations of the parts take place in arcs which are tangent to each other, and the curves thus diverging from the common point there will be an increased tension on each side during the oscillations of the diaphragm.

By reason of the arc described by the stylus bar in my device being upon the inside of the arc described by the compression member, it will be seen that the pressure will be very little increased during each half oscillation, and the stylus bar will vibrate more freely, and with a greater amplitude of vibration of the diaphragm, thus giving a louder and clearer tone. Another advantage of my device is that great sensibility can be obtained by the use of members of nearly the same length, and the apparatus thus provides a very sensitive and elastic mounting for the stylus bar responsive to minutest sound wave movement, and a greater amplitude of vibrations of the diaphragm, with a corresponding loud, distinct and natural tone.

In the modification shown in Fig. 8, the stylus bar and the tension means are placed in the plane of the diaphragm. The stylus bar is pressed upon its seats by means of an adjusting screw and nut as at 25, between the stationary sound-box casing and the stylus bar. In Fig. 9 I have shown this adjusting screw and nut as replaced by a U-shaped spring 25^a having a point pressing on the stylus bar, and two other points on a small slide 27 which can be adjusted by means of screws 27^a. The tension of the

spring may be adjusted by means of a screw 26.

In Figs. 11 to 16 inclusive the sound-box ring is not itself employed as a compression member, being adjusted on studs 32 upon knife edges 31.

The adjusting screw 25 which engages the stylus bar can be set in position by means of screws 25^b, the ring being split so as to loosen the adjusting screws.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. In a sound reproducing machine, the combination with a sound-box casing, a diaphragm, a stylus bar and a bearing located exterior to the sound-box casing, of a tensioning device having an engagement point on the stylus bar located on one side of the fulcrum of said bar and a stationary point located upon the other side of said fulcrum.

2. In a sound reproducing machine, a sound-box casing, a diaphragm and stylus bar, a bearing therefor located exterior to the sound-box, a tensioning or engagement point located on the stylus bar at one side of the fulcrum of said bar, and a stationary point of support upon the opposite side.

3. In a sound reproducing machine, a sound-box casing, diaphragm and stylus bar, a bearing or fulcrum for said bar, a contact point formed at one side of said fulcrum, a compression device having one end in engagement with said contact point, and a fixed stationary point with which the other end of the compression device is in contact.

4. In a sound reproducing machine, a sound-box casing, a diaphragm, a stylus bar, bearings therefor, said bearings consisting of cylindrical studs, and corresponding holes of larger diameter, said studs and holes having co-acting grooves and knife edges, and a tensioning device consisting of a compression arm having bearings upon opposite sides of the stylus bar bearings.

5. In a sound reproducing machine, the sound-box casing, a diaphragm, a stylus bar, a plate fixed to the sound-box casing, cylindrical knife edge and V-shaped groove bearings for the stylus bar, said bearings being carried upon the plate, a contact point in the stylus bar at one side of the bearings, a fixed point carried upon the opposite edge of the plate and exterior to the bearings, and a tensioning bar having its ends engaging respectively the contact points.

6. In a sound reproducing device of the character described, a sound-box having a plate fixed transversely to one side and projecting therefrom, a diaphragm, a stylus bar having one end fixed to the diaphragm, a transverse bar to which the other end is fixed, circular co-acting groove and knife edge bearings carried by the plate, and upon which the transverse bar is capable of

oscillation, a bearing point upon said bar at
one side of the fulcrum point, an adjustable
point and a support therefor carried upon
the outer edge of the plate and upon the
5 opposite side of the fulcrum, and a tension-
ing bar having its opposite ends engaging
the two contact points.

In testimony whereof I have hereunto set
my hand in presence of two subscribing wit-
nesses.

ANDRÉ JUNOD.

Witnesses:

GEO. H. STRONG,

CHARLES A. PENFIELD.

J. E. HOUGH.
 PHONOGRAPH.
 APPLICATION FILED SEPT. 9, 1907.

905,184.

Patented Dec. 1, 1908.

2 SHEETS—SHEET 1.

Fig. 1.

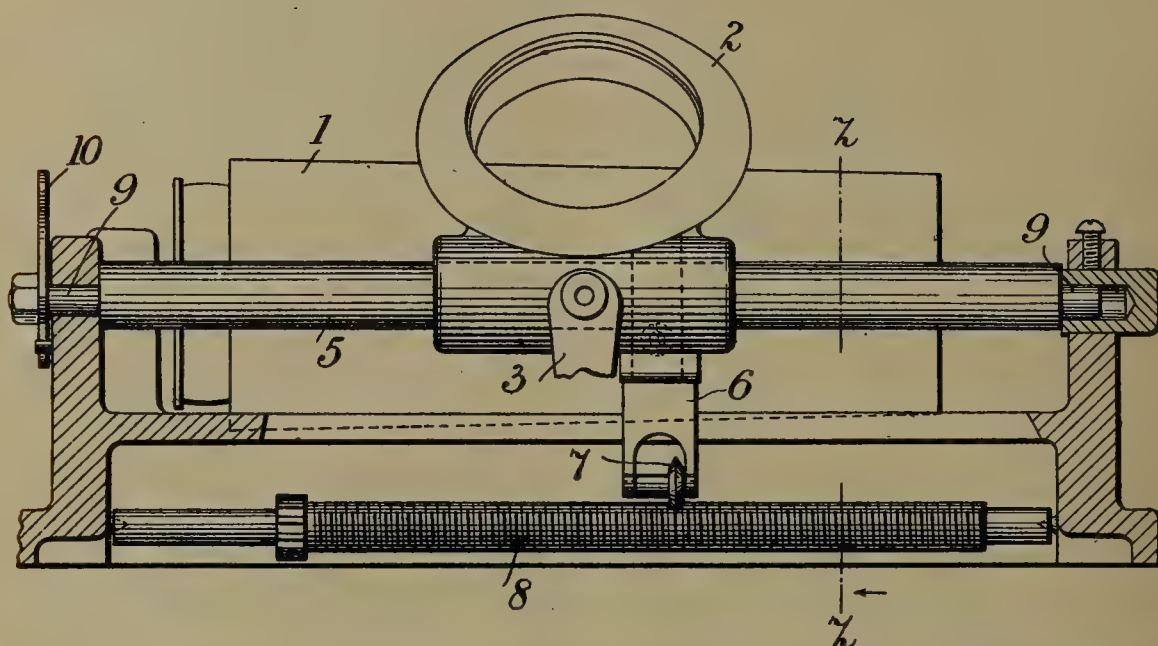
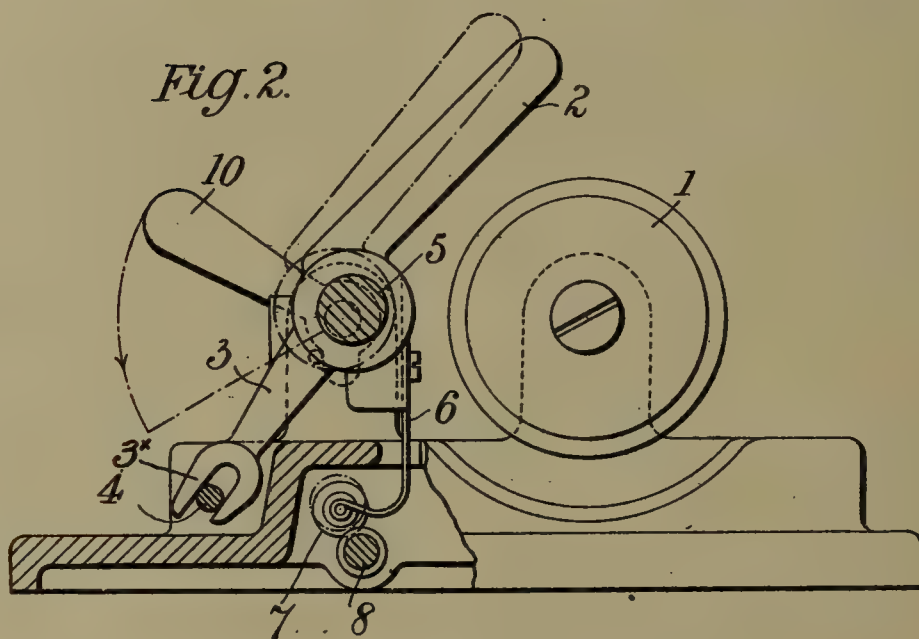


Fig. 2.



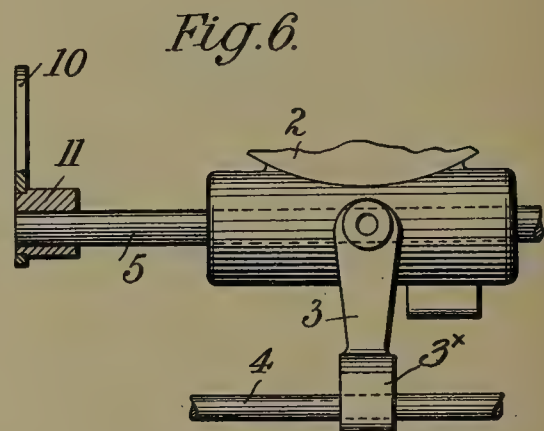
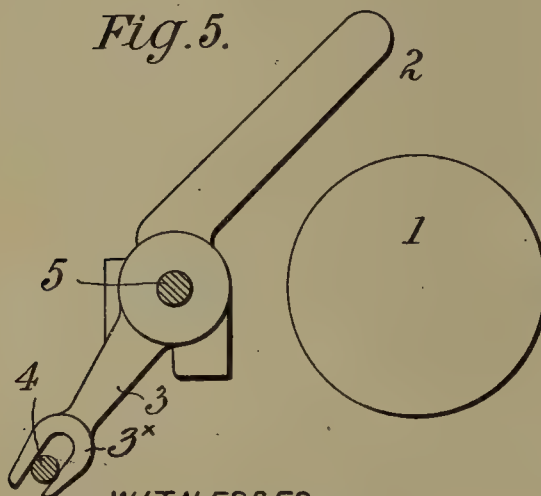
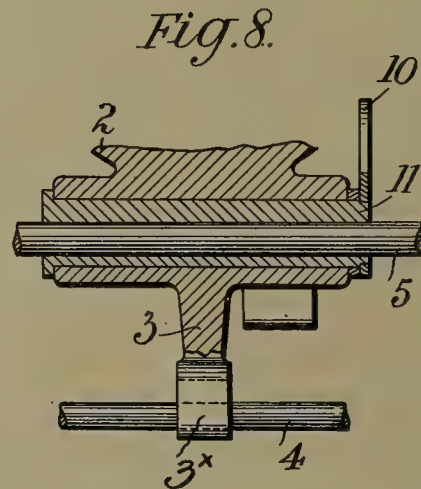
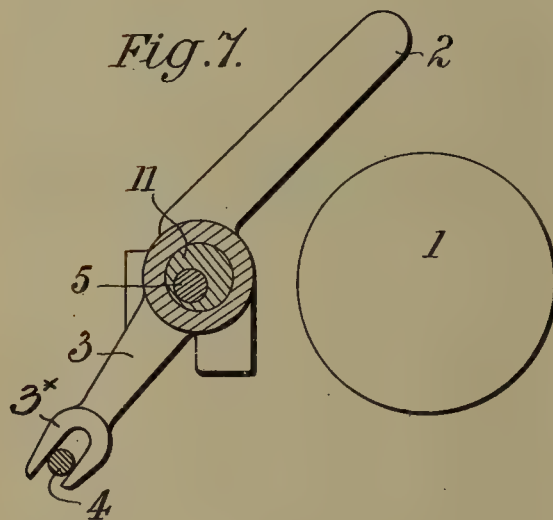
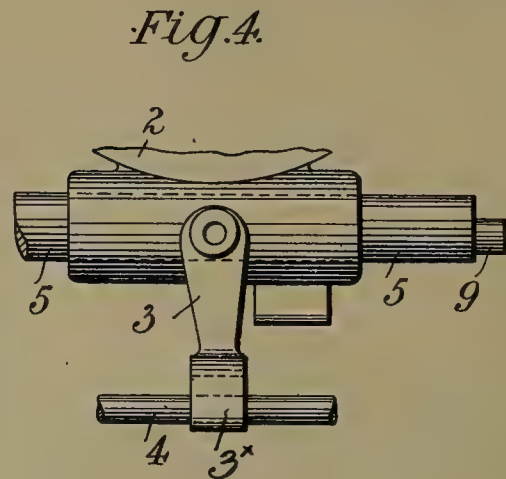
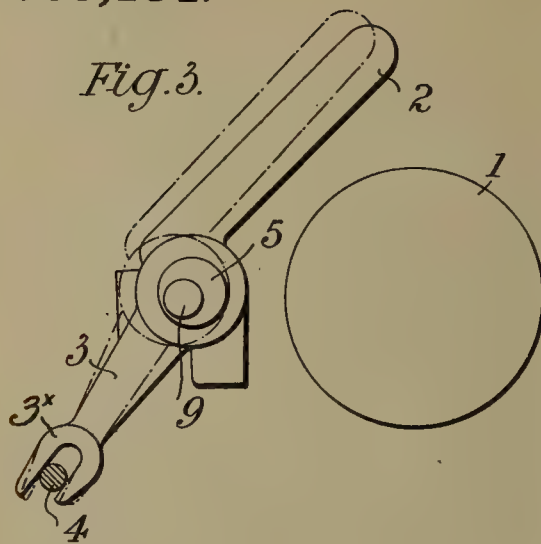
WITNESSES.
 Lillie M. Perry.
 Ed. Finzel.

INVENTOR.
 James Edward Hough
 by W. M. Finzel Atty.

905,184.

Patented Dec. 1, 1908.

2 SHEETS—SHEET 2.



WITNESSES.
 Lillie M. Perry.
 E. L. Finckel.

INVENTOR.
 James Edward Hough
 by Wm. H. Finckel Atty.

UNITED STATES PATENT OFFICE.

JAMES EDWARD HOUGH, OF LONDON, ENGLAND.

PHONOGRAPH.

No. 905,184.

Specification of Letters Patent.

Patented Dec. 1, 1908.

Application filed September 9, 1907. Serial No. 391,966.

To all whom it may concern:

Be it known that I, JAMES EDWARD HOUGH, a subject of His Majesty the King of Great Britain, and a resident of London, England, have invented a certain new and useful Improvement in Phonographs and Like Talking-Machines, of which the following is a specification.

In phonographs as now commonly constructed it is customary to mount the disk carrying the reproducing stylus in an arm or frame, one end of which embraces a guiding rod, while the arm also carries a half nut adapted to engage with the screwed traverser rod, the half nut and the disk being raised out of or lowered into engagement by a pivoted cam adapted to rest on a fixed bar of the machine. Various slight modifications of this well known construction have also been suggested.

According to the present invention, it is proposed that the guiding rod should be eccentrically and movably mounted in the frame or in an eccentrically movable bushing so as to act as a species of crank which can be partially rotated so as to bring the frame or arm carrying the disk nearer to or farther from the mandrel on which the record is to be placed, or as an equivalent, the eccentric bushing may be interposed between the rod and the arm, in either case the motion preferably at the same time bringing the half nut or other engaging or feeding device into or removing it from contact with the screwed traverser bar.

Where the frame or arm is supported upon a guiding rod and arranged in front of the mandrel, a convenient arrangement is to have a rearward extension formed rigidly with and projecting substantially diametrically opposite to such arm and embracing a fixed rod situated in a plane outside of and below that of the guiding rod and adapted to take some of the weight of an overhanging horn, where that is employed.

In the accompanying drawings, illustrating the invention, in the several figures of which like parts are similarly designated, Figure 1 is a front elevation, partly in section, illustrating a method of carrying out the invention. Fig. 2 is an end view on the line $z-z$, showing some of the parts omitted, of Fig. 1. Fig. 3 is an end view, showing the different positions the frame can be made to take. Fig. 4 a front view of same. Figs. 5 and 6 show the eccentric bushing

applied to the ends of the guiding rod, and Figs. 7 and 8 show the bushing between such rod and the carrying arm.

In the drawings, 1 is the usual mandrel, 2 the frame or arm carrying the reproducing or cutting disk and having a backward extension 3 rigidly fixed thereto and projecting substantially diametrically opposite to said arm, and having its free end 3* bifurcated and adapted to embrace a fixed rod 4, in such manner as to traverse upon said rod and also being capable of a slight transverse and rotary or oscillating movement thereupon to permit the movement of the reproducer arm. The frame 2 also has fixed thereto a spring arm 6 upon which is mounted the wheel 7 which engages with traverser bar 8, arranged below and in substantially the same plane with the guiding-rod 5.

As shown in Figs. 1 to 4, the frame or arm 2 and its extension 3 are mounted upon the guiding-rod 5 eccentrically mounted in the frame of the machine, the trunnions 9 not coinciding with the center of rod 5, and the longest radius of the eccentric rod being arranged in substantially longitudinal alinement with the reproducer arm and its attached extension, the construction and arrangement being such that when said rod is turned, as by crank 10, the frame or arm 2 is caused to rise or fall, or caused to oscillate, the engagement of the bifurcated end of the extension 3 with the rod 4 serving as the pivot point or center of such oscillating movement (as shown in dotted lines, Fig. 3), thus bringing the disk carried by the reproducer arm nearer to or farther from the mandrel 1, and at the same time bringing the engaging or feeding device 7 into or removing it from contact with the traverser bar 8. Thus it will be seen that the fixed rod 4 and the bifurcated end of extension 3, forming the pivot during such movement, will serve to take some of the weight of the reproducer arm and the horn attached thereto.

In Figs. 5 and 6 the cam motion is imparted to the guiding rod 5 by mounting it in eccentric bushings 11, which can be turned in the frame, while in Figs. 7 and 8, such bushings are shown on the guiding rod between it and the arm 2.

It is obvious that the positions in the frame of the fixed rod, guiding rod and traverser bar may be varied depending upon whether it is desired to have some or all

of them in front of or behind the mandrel and that the lower rod 4 may be used to produce the cam motion and rod 5 be the fixed one, but the construction indicated will be found efficient.

What I claim is:—

1. In phonographs and like talking machines, a reproducer arm, a guiding rod therefor eccentrically and movably mounted, an extension rigidly connected to said reproducer arm and extending substantially diametrically opposite therefrom and provided with a bifurcated end, and a fixed rod adapted to be engaged by the bifurcated end of said extension to form a pivot point for said reproducer arm, the longest radius of said eccentrically mounted guiding rod being arranged in substantially longitudinal alinement with the reproducer arm and its attached extension, whereby by the movement of the eccentrically mounted guiding rod, the reproducer arm is caused to oscillate upon said pivot point, substantially as and for the purposes set forth.

2. In machines of the class described, a reproducer arm, a guiding rod therefor, a fixed rod arranged in a plane outside of said guiding rod, an extension rigidly fixed to and projecting substantially diametrically opposite to said reproducer arm and provided with a bifurcated end adapted to engage said fixed rod and having an oscillatory and transverse movement thereon, and an eccentric on said guiding rod having its longest radius in substantially longitudinal

itudinal alinement with the reproducer arm and its attached extension and adapted to oscillate the reproducer arm and its attached extension, to thereby raise and lower the reproducer arm, substantially as and for the purpose described.

3. In machines of the class described, a reproducer arm, a guiding rod therefor, a fixed rod arranged in a plane outside of said guiding rod, an extension rigidly fixed to and projecting substantially diametrically opposite to said reproducer arm and provided with a bifurcated end adapted to engage said fixed rod and having an oscillatory and transverse movement thereon, a traverser bar, a feeding device carried by said reproducer arm and engaging said traverser bar, and an eccentric on said guiding rod having its longest radius in substantially longitudinal alinement with the reproducer arm and its attached extension and adapted to oscillate the reproducer arm and its attached extension, to thereby raise and lower the reproducer arm with relation to the mandrel and to move the feeding device into and out of engagement with the traverser bar, substantially as and for the purpose described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JAMES EDWARD HOUGH.

Witnesses:

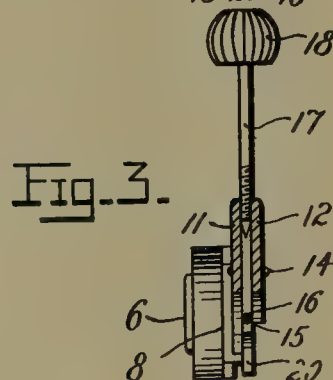
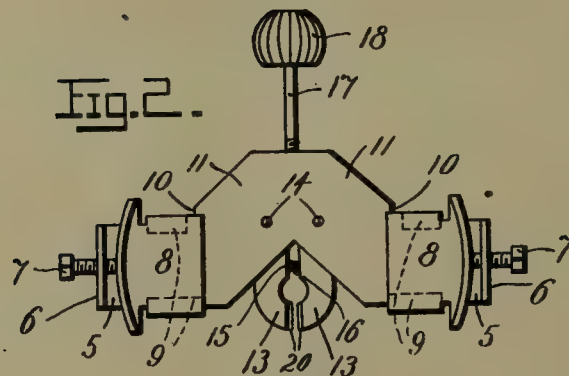
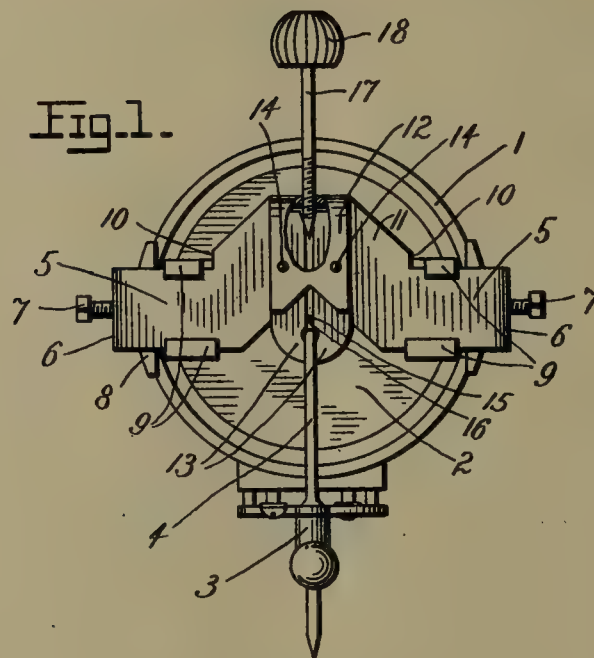
FREDERICK FOX,
LEONARD WEETCH.

Wm. H. Fox
Ed. Hough
Heetch

J. E. O'NEEL & E. JENKINS.
TONE MODULATOR FOR GRAPHOPHONES.
APPLICATION FILED MAY 29, 1908.

905,220.

Patented Dec. 1, 1908.



Witnesses:
T. Honoyama.
B. E. Cooney.

Inventors
and Jesse E. O'Neel
Eugene Jenkins.
By *Charles Chandler*
Attorneys.

UNITED STATES PATENT OFFICE.

JESSE E. O'NEEL AND EUGENE JENKINS, OF TILLAMOOK, OREGON.

tone-MODULATOR FOR GRAPHOPHONES.

No. 905,220.

Specification of Letters Patent.

Patented Dec. 1, 1908.

Application filed May 29, 1908. Serial No. 435,774.

To all whom it may concern:

Be it known that we, JESSE E. O'NEEL and EUGENE JENKINS, citizens of the United States, residing at Tillamook, in the county of Tillamook, State of Oregon, have invented certain new and useful Improvements in Tone-Modulators for Graphophones; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to improvements in tone-modulating devices for graphophones, and it resides, generally, in the provision of an extremely simple, inexpensive, and efficient device adapted for attachment to a sound-box of any ordinary type and including a pair of oppositely-disposed jaws movable into and out of engagement with the vibrating transmitter-bar of the sound-box, so as to control the amplitude of the vibrations.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which corresponding parts are designated by the same reference numerals throughout the several views.

Of the said drawings, Figure 1 is a front elevation of the sound-box of a graphophone with the improved modulator attached thereto, a portion of the tongue of the clamp being broken away. Fig. 2 is a rear elevation of the modulator. Fig. 3 is a section taken vertically through the modulator.

Referring more particularly to the drawings, 1 designates a sound-box of any ordinary construction, 2 the mica diaphragm thereof, 3 the needle holder, and 4 the vibratory transmitter bar which is connected at its lower end with said holder and at its upper end with the diaphragm in the usual manner.

The modulator which is designed for use in connection with the sound box comprises a supporting strap 5 provided at each end with a lateral flange 6 having a central perforation formed therein through which an adjusting screw 7 extends, the inner end of each screw impinging against an arcuate lateral flange formed upon the outer edge of a slide 8, said slides being movable upon the ends of the strap with which they are engaged by means of pairs of ears 9 which

extend across the upper and lower edges of the strap and are bent towards each other as shown, the movement of the slides in one direction being limited by the contact of their upper ears with the shoulders resultant from the formation of the V-shaped bend 11 intermediate the ends of the strap. The supporting strap further includes an integral tongue 12 which forms an extension of the bend 11 and has its major portion arranged in spaced relation to and parallel with the front face of the strap. In the space between the tongue and the strap is fitted a pair of oppositely-disposed jaws 13 pivoted intermediate their ends as indicated by the numerals 14, 14, the pivot pins passing through the tongue and through the strap. Towards their lower ends, the jaws are connected by means of a pin 15 whose opposite ends fit in alining sockets formed in the inner or mutually-adjacent edges of the jaw, said pin being embraced by a tiny expansible coil spring 16, the tension of which normally forces the lower ends of the jaws away from each other.

The lower ends of the jaws are forced towards each other against the action of the spring by means of an endwise movable threaded rod 17 which extends through an opening formed in the laterally-bent upper end of the tongue and has its tapered or wedge-shaped lower end fitted between the upper ends of said jaws. The upper end of said rod is provided with a milled head 18, by means of which it is rotated, the inward movement of said rod effected by its rotation in one direction causing its lower end to advance between the upper ends of the jaws, forcing said ends away from each other, in consequence of which the lower ends of the jaws will approach each other.

In attaching the device to the sound-box, the slides 8 are tightened against the side wall thereof, by means of the screws 7, the laterally-bent upper end of the transmitter-bar passing between the inner edges of the jaws which as above stated, are normally forced away from each other by the coil-spring 16. When it is desired to modulate the sound vibrations, the rod 17 is moved inwardly, whereupon the lower ends of the jaws will be forced into contact with the transmitter bar at opposite sides thereof, the inward movement of said rod being con-

tinued, until the requisite pressure is exerted upon said bar, the tone softening as the tension upon the bar increases.

The strap and the slides are preferably constructed of brass and the jaws of aluminum, the latter metal imparting a peculiarly soft tone to the instrument upon which it is placed and permitting a more gradual modulation of the tone.

If preferred, each jaw may have secured to the lower edge thereof a thin facing or cushion of rubber 20.

It will be apparent from the foregoing, that the tone regulation is at all times under the control of the operator, the changes in tone being effected merely by a rotation of the controlling rod 17 in one direction or the other, without necessitating the stopping of the instrument. It will likewise be apparent that by reason of the simplicity of the device, it may be constructed at an extremely low cost.

What is claimed is:

1. The combination, with the sound-box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, and a pair of oppositely-disposed members carried by the support and movable into and out of engagement with the transmitter-bar.

2. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, and a pair of oppositely-disposed members carried by the support and movable simultaneously into and out of engagement with the transmitter-bar.

3. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, and a pair of oppositely-disposed jaws pivoted to the support and movable into and out of engagement with the transmitter-bar.

4. The combination, with the sound-box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, and a pair of oppositely-disposed jaws pivoted to the support and movable simultaneously into and out of engagement with the transmitter-bar.

5. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, and a pair of transversely-disposed members carried by the support and arranged upon opposite sides of the transmitter-bar, said members being movable into and out of engagement with said bar.

6. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapt-

ed for attachment to the sound-box, and a pair of transversely-disposed members pivoted to the support and arranged upon opposite sides of the transmitter-bar, said members being movable into and out of engagement with said bar.

7. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, and a pair of transversely-disposed members carried by the support and arranged upon opposite sides of the transmitter-bar, said members being movable simultaneously into and out of engagement with said bar.

8. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, and devices carried by said support and arranged upon opposite sides of the transmitter-bar, for engagement with said bar.

9. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, a pair of jaws carried by the support and arranged for engagement with the transmitter-bar, and means for adjusting the tension of said jaws upon said bar.

10. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, a pair of jaws pivoted to the support and arranged upon opposite sides of the transmitter-bar, for engagement therewith, and means for adjusting the tension of said jaws upon said bar.

11. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, a pair of jaws pivoted to the support and arranged upon opposite sides of the transmitter-bar, for engagement therewith, and endwise-movable means for adjusting the tension of said jaws upon said bar.

12. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, a pair of jaws pivoted to the support and arranged upon opposite sides of the transmitter-bar, for engagement therewith, and an endwise-movable member carried by said support and engaged with said jaws, for adjusting the tension of said jaws upon said bar.

13. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, a pair of jaws pivoted intermediate their ends to the support and arranged upon opposite

sides of the transmitter-bar, and an endwise-movable member having one end thereof extending between the adjacent ends of said jaws, for forcing the other ends of the latter into engagement with said bar.

14. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, a pair of jaws pivoted intermediate their ends to the support and arranged upon opposite sides of the transmitter-bar, and an endwise-movable member having a tapered end extending between the adjacent ends of said jaws, for forcing the other ends of the latter into engagement with said bar.

15. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, a pair of jaws pivoted intermediate their ends to the support and arranged upon opposite sides of the transmitter-bar, and an endwise-movable rotatable member having a tapered end extending between the adjacent ends of said jaws, for forcing the other ends of the latter into engagement with said bar.

16. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, a pair of jaws pivoted intermediate their ends to the support and arranged upon opposite sides of the transmitter-bar; means for normally forcing the lower ends of the jaws away from each other and from the bar; and means arranged for engagement with the upper end of said jaws to force said lower ends towards each other and into engagement with said bar, against the action of the first-mentioned means.

17. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, a pair of jaws pivoted intermediate their ends to the support and arranged upon opposite sides of the transmitter-bar; means for normally forcing the lower ends of the jaws away from each other and from the bar, and the upper ends thereof towards each other; and an endwise-movable member having its lower end fitting between the upper ends of said jaws, for forcing the same away from each other and the lower ends thereof towards each other and into engagement with said bar, against the action of the first-mentioned means.

18. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, a pair of jaws pivoted intermediate their ends to the support and arranged upon opposite sides of the transmitter-bar; means for

normally forcing the lower ends of the jaws away from each other and from the bar, and the upper ends thereof towards each other; and an endwise-movable member having a tapered lower end fitting between the upper ends of said jaws, for forcing the same away from each other and the lower ends thereof towards each other and into engagement with said bar, against the action of the first-mentioned means.

19. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, and a pair of oppositely-disposed members carried by the support and movable into and out of engagement with the transmitter-bar, each member being provided with a facing of yielding material.

20. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound box, and a pair of oppositely-disposed members carried by the support and movable into and out of engagement with the transmitter-bar, each member being provided with a facing of rubber.

21. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, and a pair of oppositely-disposed jaws pivoted to the support and movable into and out of engagement with the transmitter-bar, each jaw being provided with a facing of yielding material.

22. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, and a pair of oppositely-disposed jaws pivoted to the support and movable into and out of engagement with the transmitter-bar, each jaw being provided with a facing of rubber.

23. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, and gripping means carried by the support and arranged for engagement with the transmitter-bar.

24. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box, gripping means carried by the support and arranged for engagement with the transmitter-bar; and means for adjusting the tension of said gripping means upon said bar.

25. The combination, with the sound box of a graphophone, and its transmitter-bar, of a tone-modulator, comprising a support adapted for attachment to the sound-box,

and gripping means carried by the support
and arranged for engagement with the trans-
mitter-bar, the gripping edges of said means
having a facing of yielding material secured
5 thereto.

26. The combination, with the sound box
of a graphophone, and its transmitter-bar,
of a tone-modulator, comprising a support
adapted for attachment to the sound-box,
10 and gripping means carried by the support

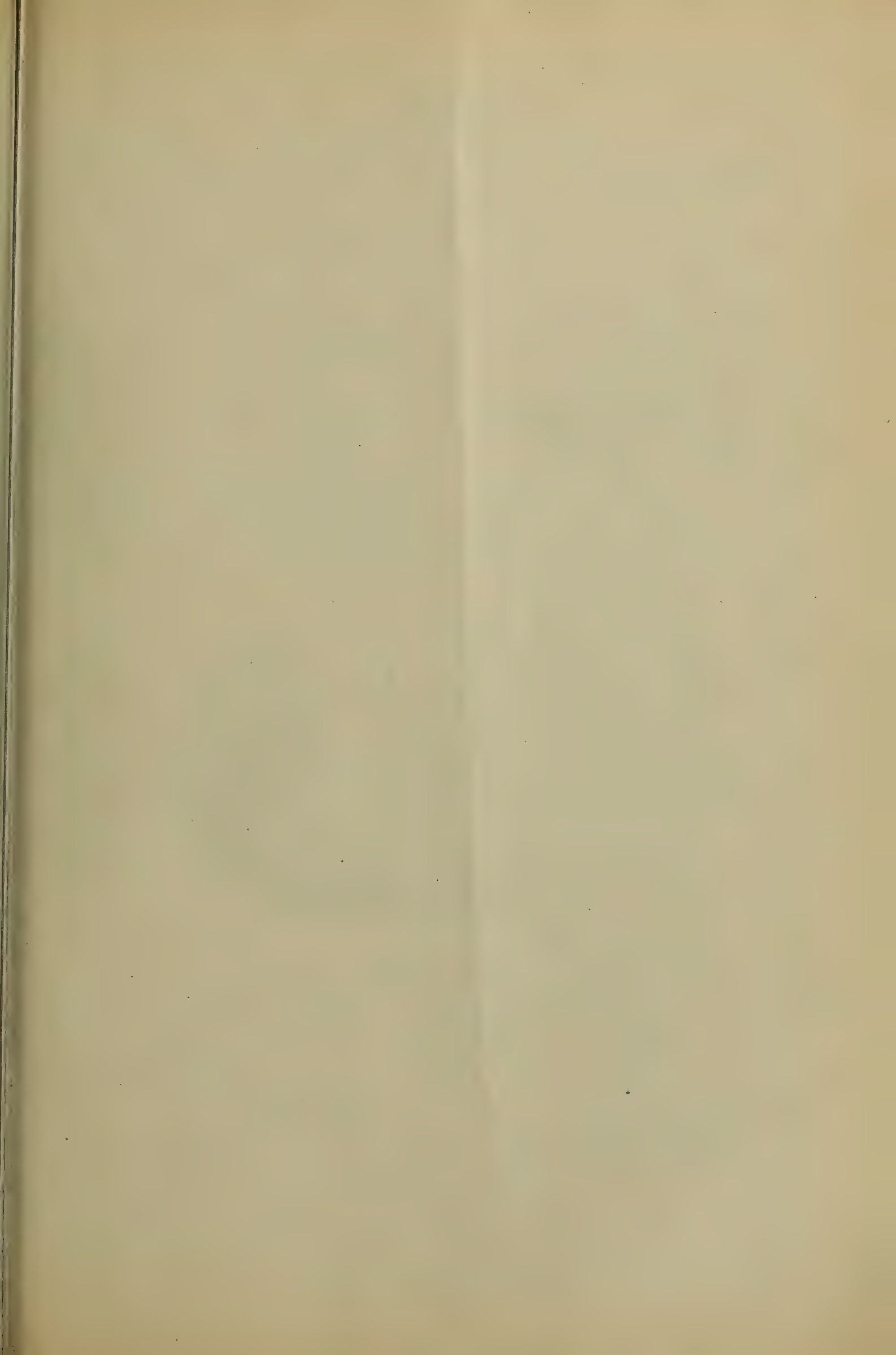
and arranged for engagement with the trans-
mitter-bar, the gripping edges of said means
having a facing of rubber secured thereto.

In testimony whereof, we affix our signa-
tures in presence of two witnesses.

JESSE E. O'NEEL.
EUGENE JENKINS.

Witnesses:

WESLEY RUSH,
A. W. SEVERANCE.



L. H. DEVINEAU.
 PHONOGRAPHIC HORN.
 APPLICATION FILED MAR. 16, 1908.

905,855.

Patented Dec. 8, 1908.

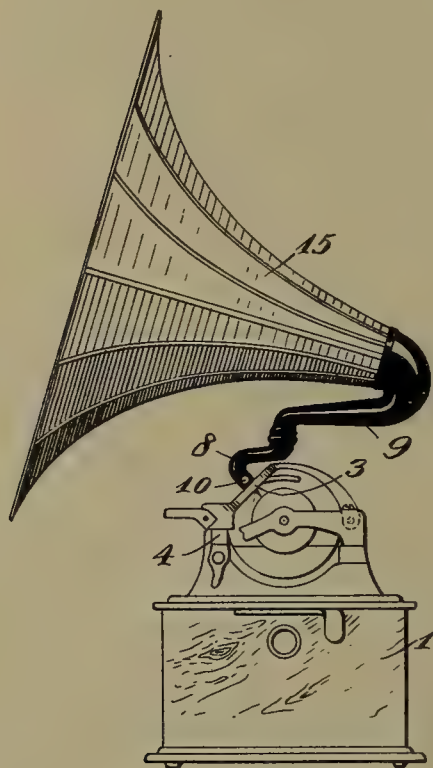


FIG. 1

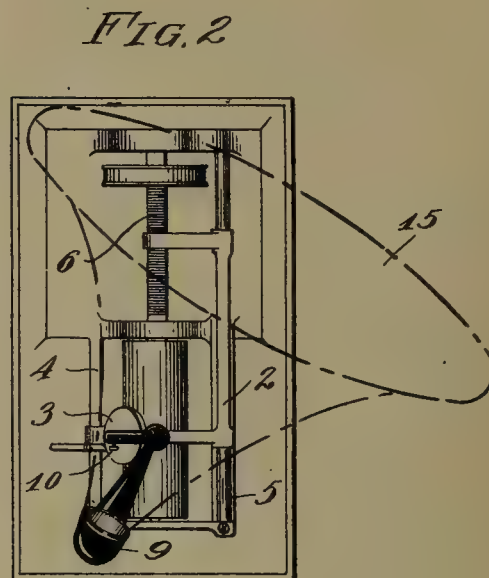


FIG. 2

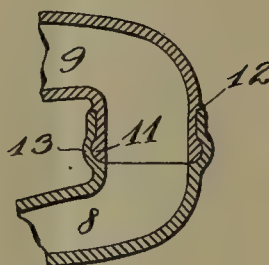


FIG. 5

FIG. 3

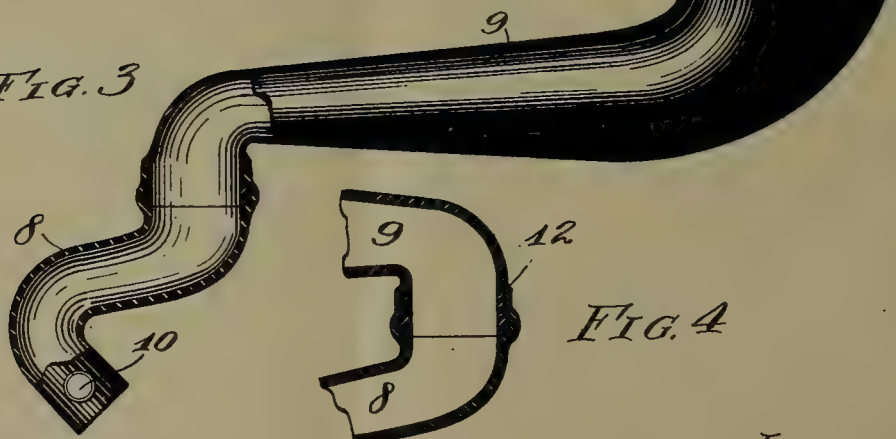
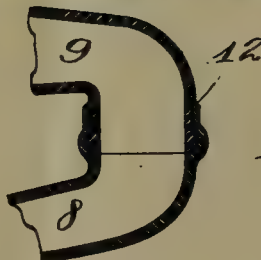


FIG. 4



WITNESSES:

Brennan & West.
 Nathan F. Fretten

INVENTOR,

Louis H. Devineau.
 BY Bates, Gontz & Hull
 ATTYS.

UNITED STATES PATENT OFFICE.

LOUIS H. DEVINEAU, OF CLEVELAND, OHIO.

PHONOGRAPHIC HORN.

No. 905,855.

Specification of Letters Patent.

Patented Dec. 8, 1908.

Application filed March 16, 1908. Serial No. 421,394.

To all whom it may concern:

Be it known that I, LOUIS H. DEVINEAU, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Phonographic Horns, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

My invention relates to phonographic horns and the means for supporting the same in coöperation with the phonograph.

The object of the invention is first, the provision of a support which will distribute the weight of the horn upon the members which support it, at the same time allowing the horn to be freely rotated in a horizontal plane; second, the arrangement of the supporting portion of the horn so that the swivel comes in the line of the center of gravity of the horn.

Reference should be had to the accompanying drawings, in which

Figure 1 is a side elevation of a phonograph, showing my horn supported in proper position; Fig. 2 is a plan view of Fig. 1, the bell of the horn being indicated in dotted lines; Fig. 3 is a side elevation, partly sectional, of the horn and swiveled section; Fig. 4 is a sectional elevation of the swivel joint; Fig. 5 is a similar view sectioned without reference to the nature of the material preferred.

The phonograph shown is of ordinary and well known construction, and may be briefly stated as comprising the casing 1, which contains the operating mechanism and which is surmounted by a carriage 2 which supports the reproducer 3. This carriage is mounted upon suitable tracks 4 and 5 along which it is adapted to travel by reason of its engagement with the screw threaded shaft 6, in a manner well known in the art. This shaft 6 actuates a mandrel 7 which in turn supports the record cylinder. The mandrel is suitably supported in stationary brackets mounted upon the casing 1.

The horn comprises two hollow elbows 8 and 9, which are connected by a swivel joint, and a flaring bell carried by the larger end of the upper elbow. The two elbows are so swiveled that the upper part 9 may rotate with respect to the lower part 8 and yet be inseparably held thereto. The lower part or supporting section 8 is adapted to be secured upon the reproducer in any con-

venient manner. The ordinary reproducer is formed with a tubular portion extending from its upper face, and in the form shown the lower portion of the member 8 surrounds such tubular projection and is secured in place thereon by a set screw as indicated at 10. The upper elbow, or turning section 9 of the horn, is given the form shown, the upper portion being formed with an enlarged flaring bowl which engages the smaller end of the bell 15 and securely holds it. The bell is made of light material, as paper, or aluminum, for example. The lower part or smaller end of the elbow 9 is formed with an annular rib 11 and a shoulder 12. The upper end of the member 8 is sleeved over this smaller end of the member 9 and is formed with an annular groove or depression 13 which engages the rib 11, while the end of the member 8 abuts against the shoulder 12.

The described joint may be made by first forming the shoulder and rib upon the member 9 then placing the upper part of the member 8 over the lower part of the member 9, the member 8 being sufficiently great in diameter to slip over the ridge 11, and then applying pressure to the sleeve by means of suitable dies so as to conform the sleeve 8 to fit around the rib 11 and abut against the flange 12. It will be seen that the members 8 and 9 are held securely together and yet relative movement between them is permitted.

The support is designed in such manner that when it is mounted upon the reproducer the plane of the vertical axis of the swivel joint will substantially divide the distance between the points of support of the reproducer. In practice, the machines are so constructed that the axis of the mandrel shaft which supports the record cylinder will also lie in this same plane. Moreover, the proportions of the bell and elbow 9 are such that the center of gravity of the combined horn will likewise lie in the plane of the vertical axis of the swivel joint.

From the above description it is clear that a single vertical line will pass through the center of gravity of the horn with its elbow, and will substantially divide the distance between the points of support of the sound reproducer and pass substantially through the axis of the mandrel. Therefore, it follows that the weight of the horn will be equally borne by the front and rear rails which sup-

port the carriage 5. This will prevent unequal friction between the frame and the rails 4 and 5, and thereby secure a more even and smooth running of the reproducer along the record cylinder. Again, there will be no bending effect upon the swivel joint, due to the fact that the center of gravity of the horn lies in the vertical axis of the joint, therefore the horn may be turned in any desired direction and have a perfect balance at all times.

The material from which the elbows are made is non-metallic and may be hard rubber (which is six times lighter than brass or steel), papier mâché, compressed fiber, celluloid, or any analogous substance. This allows the easy formation of the swivel joint. Moreover, I have found that a non-metallic substance, such as mentioned, practically does away with the metallic character of the sound which is produced in the ordinary talking machine.

I claim:

1. A support for phonographic horns having oppositely disposed elbows, said support being swiveled intermediately of said elbows, combined with a reproducer which supports said horn.

2. A support for phonographic horns comprising two members swivelly joined together and provided with oppositely disposed elbows at their opposite ends, combined with a reproducer which supports said horn.

3. In a phonograph, the combination of a reproducer, and a support mounted thereon having oppositely disposed elbows, a swivel between said elbows and a horn mounted upon said support extending upon both sides of the point of support.

4. In a phonograph, the combination of a reproducer and a laterally extending horn supported thereby, said horn extending upon both sides of the point of its support and having a swivel in the plane of the center of gravity of the horn.

5. In a phonograph, the combination of a reproducer and a laterally extending horn supported thereby, said support comprising

members swivelly connected together, said horn extending upon both sides of the swivel joint.

6. In a phonograph, a reproducer, a member mounted upon said reproducer, a second member swivelly connected to the first member, and a horn supported by the second member extending laterally upon both sides of the support of the first member.

7. In a phonograph, the combination of a reproducer, means for supporting said reproducer, and a horn supported upon said reproducer, said horn being swiveled in a vertical plane passing between the points of support of the reproducer and extending laterally upon both sides of the point of support.

8. In a phonograph, the combination of a reproducer, a horn supported upon said reproducer, said horn being swiveled about an axis which passes through the center of gravity of the horn.

9. The combination with a phonograph reproducer, of a horn having a swivel substantially in the line of the center of gravity of the horn.

10. In a phonograph, a reproducer, means for supporting said reproducer, a horn support carried upon said reproducer, an elbow carried by said support, and a bell carried by said elbow, said support and elbow being swiveled together in a vertical plane which passes through a point between the points of the support of the reproducer, and also through the center of gravity of the horn.

11. In a phonograph, the combination of a reproducer, a support mounted upon said reproducer having oppositely disposed elbows, said horn being swiveled intermediately of elbows in a plane which passes through the center of gravity of the horn.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

LOUIS H. DEVINEAU.

Witnesses:

ALBERT H. BATES,
A. J. HUDSON.

905,899.

Patented Dec. 8, 1908.

Fig. 1.

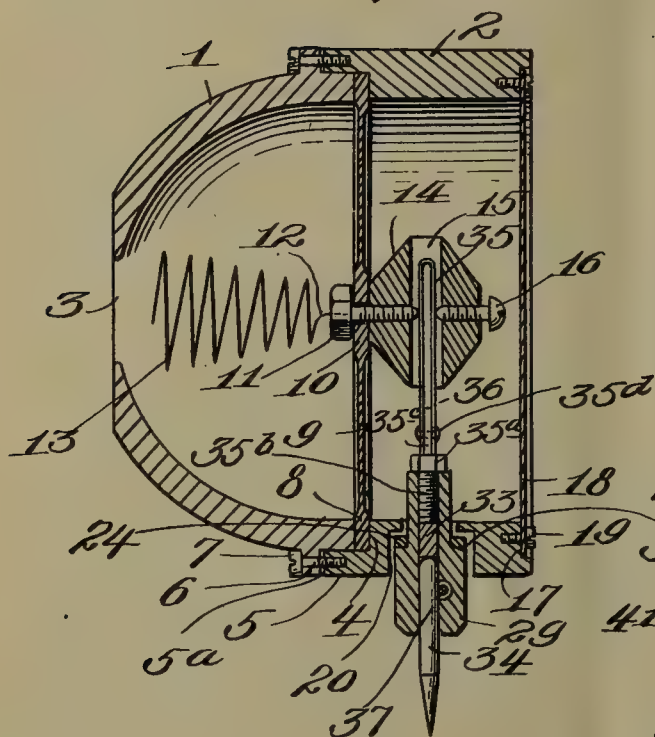


Fig. 2.

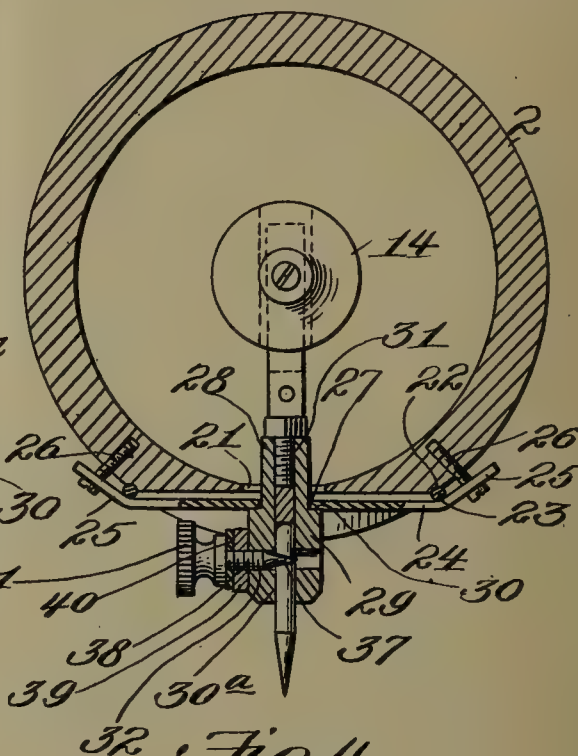


Fig. 3.

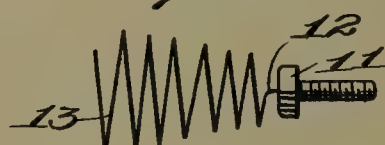
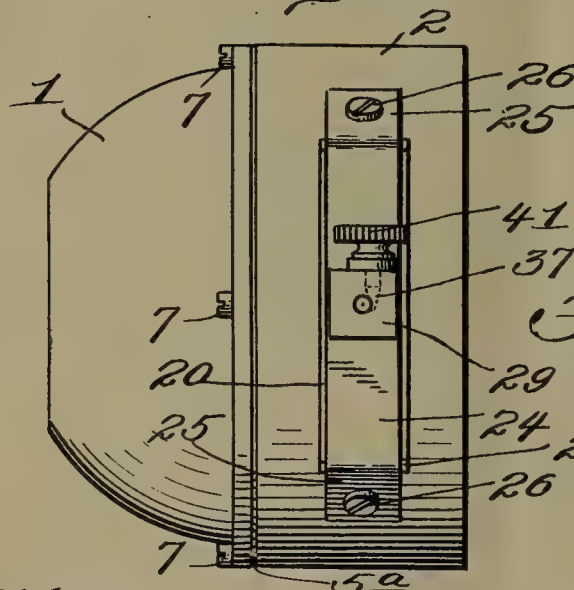
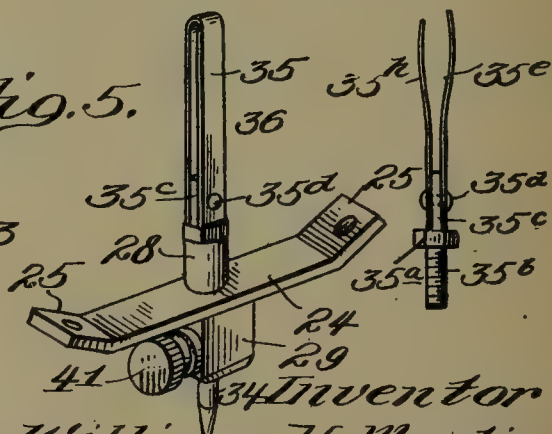


Fig. 6.

Fig. 5.



Witnesses:
C. Kessler
J. B. Kessler

Inventor
William H. Martin
By James L. Norris.

UNITED STATES PATENT OFFICE.

WILLIAM H. MARTIN, OF MOBILE, ALABAMA.

SOUND-BOX.

No. 905,899.

Specification of Letters Patent.

Patented Dec. 8, 1908.

Application filed February 3, 1908. Serial No. 414,047.

To all whom it may concern:

Be it known that I, WILLIAM H. MARTIN, a citizen of the United States, residing at Mobile, in the county of Mobile and State of Alabama, have invented new and useful Improvements in Sound-Boxes, of which the following is a specification.

This invention relates to sound reproducing boxes for use in connection with graphophones, gramophones, phonographs or other sound-recording and reproducing machines, and is designed, primarily as an improvement upon the form of sound boxes disclosed in my application Serial Number 336,473, filed September 27, 1906, and is particularly adapted for use in connection with graphophones; but it is to be understood that the invention is adapted for any purposes for which it is found applicable, and the object thereof is to provide in a manner as hereinafter set forth a sound box for graphophones whereby an improved character of sound is produced, and furthermore whereby the sound can be regulated when occasion so requires, and whereby all scratching of the stylus on the disk is practically obliterated, being reduced to a minimum.

The invention further aims to provide a sound box for the purpose referred to and in a manner as hereinafter set forth, which shall be simple in its construction and arrangement, strong, durable, efficient in its use, attaining an improved character of sound, with means for regulating the sound, readily set up with respect to the instrument and comparatively inexpensive to manufacture, and with the reducing of scratching to a minimum.

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts hereinafter more specifically described and illustrated in the accompanying drawings, wherein is shown the preferred embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which come within the scope of the claims hereunto appended.

In the drawings, wherein like reference characters denote corresponding parts throughout the several views—Figure 1 is a vertical sectional view of a sound box in accordance with this invention; Fig. 2 is a like

view taken at right angles to Fig. 1; Fig. 3 is a bottom plan; Fig. 4 is a detail; Fig. 5 is a perspective view showing the supporting means for the stylus head, the latter having a stylus bar and stylus attached thereto. Fig. 6 is a side elevation showing a modified form of stylus bar.

Referring to the drawings by reference characters, the body portion of the sound box is formed of two sections, 1, 2, the former being dome-shaped, and the latter being cylindrical. The outer end of the section 1 is cut away to provide an opening 3 and the inner end of the section 2 has its inner face cut away to provide a shoulder 4 and a flange 5. The latter surrounds the inner end of the section 1 and abuts against a washer 5^a, mounted upon a shoulder 6 formed integral with the section 1, and through the shoulder 6 and engaging in the flange 5 extends retaining screws 7 whereby the sections 1, 2 are secured together. Ordinarily the sections 1 and 2 are pressed in together, tightly fitting for small boxes, but for larger instruments the security may be doubled by the employment of the screws 7 if required.

Interposed between the inner edge of the section 1 and the shoulder 4 is the thickened perimeter 8 of a metallic diaphragm 9. The central portion of the diaphragm 9 is thickened, as at 10, whereby the part of the diaphragm 9 between the portion 10 and the perimeter is thin and substantially concavo-convex in contour. The diaphragm 9 is secured in position between the sections 1, 2 through the medium of the tightly fitting of the sections or the retaining screws 7 when required and by setting up the diaphragm in the manner referred to vastly improves the character of sound produced.

Extending through the central portion 10, as well as being connected thereto is a headed screw 11, the head thereof abutting against said portion 10 and having attached thereto the end 12 of a spring coil 13, the coils of the spring gradually increasing in diameter outwardly, that is towards the opening 3 of the section 1. Mounted upon the central portion 10 of the diaphragm 9 is a block 14 diamond-shaped in cross section and which is connected to the screw 11 and formed with a vertically-extending opening 15 which constitutes a socket. Connected to the block 14 is a transversely-extending set screw 16, the inner end thereof projecting into the socket

15 and in alinement with the inner end of the screw 11, said inner end of the screw 11 also projecting into the socket 15. The inner ends of the screws 11, 16 constitute contacts. The block 14 and screws 11 and 16 associate with the stylus bar, as will be hereinafter referred to.

The section 2 has its outer edge cut away to form a seat 17 against which is mounted a metallic diaphragm 18, the latter being secured in position by the holdfast devices 19, said devices extending through the diaphragm 18 and engaging in the section 2. The bottom of the section 2 is formed with a transversely - extending pocket 20, which communicates with a vertically - extending opening 21. The function of the pocket 20 and opening 21 will be hereinafter referred to. The section 2 is furthermore provided at each terminus of the pocket 20 with a semi-cylindrical socket 22, in which is mounted the pins 23 projecting from the section 2 and each constituting a fulcrum for one end of a flexible suspending means 24 for the stylus head. The said flexible suspending means consists of a narrow strip of resilient metallic material having each end portion bent upwardly at an inclination, as at 25 and through which extends connecting screws 26. These latter engage in the section 2 and are so set up that the ends of the suspending device 24 can be adjustably connected to the section 2. The suspending device 24 is mounted in the pocket 20 and bears against the fulcrums 23 and said suspending device 24, approximately centrally thereof is provided with an opening 27 which registers with the opening 21.

Extending through the opening 27, as well as through the opening 21 and projecting into the section 2 is the reduced inner end 28 of a stylus head 29. The reduced inner end 28 of the head 29 forms a shoulder 30 which abuts against the outer face of the suspending device 24. The head 29 is formed with a vertically-extending opening 30^a, the inner portion of which is screw-threaded as at 31 and the head 29 is furthermore provided with a screw-threaded opening 32 which intersects the opening 30^a. Arranged within the opening 30^a of the head 29 is a cushioning abutment 33 against which engages a stylus 34 positioned in the outer end of the opening 30^a. Engaging in the screw-threaded portion 31 of the opening 30^a is the screw-threaded end of the stylus bar 36, the latter extending in the socket 15 and between the inner ends of the screws 11 and 16. The stylus 34 is secured in the head 29 through the medium of the pointed end 37 of the binding screw 38, the said pointed end 37 being slightly curved so that it does not come in contact with the stylus 34 in a perpendicular manner, but rather to the side edge of the stylus. The object in this is that the en-

gagement between the said pointed end of the screw with the stylus is gradual and therefore, the tighter the screw when turned in the stylus bar head the more firmly the stylus is held thus avoiding any and all metallic sounds either from the looseness of the stylus or from the looseness of the screw. Positioned against the stylus head 29 is a resilient washer 39. Arranged against the washer 39 is a metallic washer 40, and bearing against the metallic washer 40 is the head 41 of the screw 38, the latter extending through the two washers. The function of the resilient washer 39 is to hold the screw at whatever position it is placed and the function of the metallic washer is to prevent the screw from coming in contact with and wearing the resilient washer. By the arrangement of the screw in a manner as set forth, the sound emanating from the box can be raised or lowered to any pitch desired. This is evident owing to the manner in which the pointed end of the screw can be adjusted with respect to its engagement with the stylus.

The stylus bar which is referred to by the reference character 36 embodies a resilient section 35 and a shouldered section 35^a, the shouldered section 35^a being formed with a screw-threaded shank 35^b and a flattened extension 35^c. The resilient section of the stylus bar is formed from a flat strip of spring metal and is bent upon itself, as clearly shown in Fig. 1 and with the ends straddling the extension 35^c, the ends of the extension 35 and extension 35^c being secured together by the hold-fast device 35^d. By such an arrangement a space is formed within the resilient section 35. The resilient section 35 of the stylus bar 36 extends in the socket 15 and is adapted to be engaged by the screws 11 and 16. The screw-threaded shank of the section 35^a engages with the screw-threaded portion 31 of the wall of the opening 30^a formed in the head 29. By setting up the resilient section in a manner as described the said resilient section extends in the socket 15, the flat inner sides thereof contact with the screws 12 and 16.

Owing to the flexibility of that end of the stylus bar which extends in the socket 15 means is provided whereby natural sound melody and volume is obtained.

In Fig. 6 of the drawings a modified form of stylus bar is set up and which consists in separating the inner terminus of the resilient section of the stylus bar so as to provide said section of two resilient members indicated by the reference characters 35^e and 35^a. Otherwise than that as stated the construction shown in Fig. 6 is the same as that shown in Fig. 5.

The stylus bar retains the resilient abutment 33 within the stylus head and the free end of the said stylus bar 36 vibrates be-

tween the inner ends of the screws 11 and 16. The space in which the inner end of the stylus bar vibrates is regulated by the screw 16.

By setting up the suspending device 24 in a manner referred to, the head 29 being rigidly secured to the said device 24, the tension of the bar can be so regulated owing to the adjustability of the screws 26, that a complete elimination of all flatness of sound is had which otherwise would affect the inner end of the stylus bar.

What I claim is—

1. A sound box comprising a vibratory diaphragm having a thickened perimeter, a thickened central portion, that part of the diaphragm between the said central portion and perimeter being relatively thin and substantially concavo convex, the thin portion of the diaphragm being of greater length than the remaining portion thereof, adjustable contacts carried by said diaphragm, a stylus bar having one end vibrating between said contacts, and a stylus connected with said bar.

2. A sound box comprising a vibratory diaphragm positioned intermediate the ends of the box and having a part thereof substantially concavo-convex in contour, contact points carried by said diaphragm, a vibratory stylus bar having one end vibrating between said contacts, and a stylus connected with said bar.

3. A sound box comprising a vibratory diaphragm positioned intermediate the ends of the box and having a part thereof substantially concavo convex in contour, adjustable contacts carried by said diaphragm, a stylus bar having one end vibrating between said contacts and embodying a doubled resilient section, and a stylus connected with said bar.

4. A sound box comprising a body portion having an opening at one end, a vibratory diaphragm positioned at a point intermediate the ends of the body portion, adjustable contacts carried by the diaphragm, a coiled spring having one end fixed to one of said contacts, a stylus bar having its inner end vibrating between said contacts, and a stylus connected with said bar.

5. A sound box comprising a stylus head, a vibratory stylus bar carried thereby and embodying a doubled resilient section, a stylus extending in the head, and a vibratory suspending device for said head.

6. A sound box comprising a stylus head, a vibratory stylus bar carried thereby and embodying a doubled resilient section, a stylus extending in the head, a vibratory suspending device for said head, and a regulating device engaging in the stylus for securing it within the head.

7. A sound box comprising a stylus head, a vibratory stylus bar carried thereby and embodying a doubled resilient section, a

stylus extending in the head, a vibratory suspending device for said head, a regulating device engaging in the stylus for securing it within the head, a vibratory diaphragm, and a pair of contacts carried thereby and between which one end of the stylus bar vibrates.

8. A sound box comprising a stylus head, a vibratory stylus bar carried thereby and embodying a doubled resilient section, a stylus extending in the head, a vibratory suspending device for said head, a regulating device engaging in the stylus head and contacting with the stylus for securing it within the head, a vibratory diaphragm, and a pair of adjustable contacts carried thereby and between which one end of the stylus bar vibrates.

9. A sound box comprising a stylus head, a resilient suspending device therefor, said device having angularly-disposed ends, a fulcruming means for said suspending device at each end thereof, a stylus bar attached to the inner end of the head, and a stylus attached to the outer end of the head.

10. A sound box comprising a stylus head, a resilient suspending device therefor, said device having angularly-disposed ends, a fulcruming means for said suspending device at each end thereof, a stylus bar attached to the inner end of the head, a stylus attached to the outer end of the head, and a regulating means carried by the head and engaging the stylus for securing the latter within the head.

11. A sound box comprising a stylus head, a resilient suspending device therefor, said device having angularly-disposed ends, a duplex fulcruming means for said suspending device, a stylus bar attached to the inner end of the head and embodying a doubled resilient section, a stylus attached to the outer end of the head, and a regulating screw extending in the head and having a curved pointed end engaging with the stylus for securing it in position.

12. A sound box comprising a stylus head, a resilient suspending device therefor, said device having angularly-disposed ends, a duplex fulcruming means for said suspending device, a stylus bar attached to the inner end of the head and embodying a doubled resilient section, a stylus attached to the outer end of the head, a regulating screw extending in the head and having a curved pointed end engaging with the stylus for securing it in position, and a cushioning means for said screw.

13. A sound box comprising a stylus head, a duplex fulcrumed resilient suspending device for said head, a resilient abutment arranged in the head, a stylus bar secured to the inner portion of the head and engaging said abutment and having a doubled re-

silient inner section, and a stylus mounted in the outer portion of the head and engaging said abutment.

14. A sound box comprising a stylus head, a duplex fulcrumed resilient suspending device for said head, a resilient abutment arranged in the head, a stylus bar secured to the inner portion of the head and engaging said abutment and having a doubled resilient inner section, a stylus mounted in the outer portion of the head and engaging said abutment, and adjustable tensioning means for said suspending device.

15. A sound box comprising a stylus head, a duplex fulcrumed resilient suspending device for said head, a resilient abutment arranged in the head, a stylus bar secured to the inner portion of the head and engaging said abutment and having a doubled resilient inner section, a stylus mounted in the outer portion of the head and engaging said abutment, adjustable tensioning means for said suspending device, and a regulating means carried by the head and engaging with the stylus for retaining it in position.

16. A sound box comprising a stylus head, a resilient suspending device for said head said suspension device provided with an angularly disposed ends, a fulcrum for each of said ends, a resilient abutment arranged in the head, a stylus bar secured to the inner portion of the head and engaging said abutment, a stylus mounted in the outer portion of the head and engaging said abutment, a vibratory diaphragm, and a pair of contacts between which the free end of said stylus bar vibrates.

17. A sound box comprising a stylus head, a resilient suspending device for said head said suspension device provided with angularly disposed ends, a fulcrum for each of said ends, a resilient abutment arranged in the head, a stylus bar secured to the inner portion of the head and engaging said abutment, a stylus mounted in the outer portion of the head and engaging said abutment, adjustable tensioning means for said device, a vibratory diaphragm, and a pair of contacts between which the free end of said stylus bar vibrates.

18. A sound box comprising a stylus head, a resilient suspending device for said head said suspension device provided with angularly disposed ends, a fulcrum for each of said ends, a resilient abutment arranged in the head, a stylus bar secured to the inner portion of the head and engaging said abutment, a stylus mounted in the outer portion of the head and engaging said abutment, adjustable tensioning means for said suspending device, a regulating means carried by the head and engaging with the stylus for retaining it in position, a vibratory diaphragm, and a pair of contacts between which the free end of said stylus bar vibrates.

19. A sound box comprising a stylus head, a resilient suspending device for said head said suspension device provided with angularly disposed ends, a fulcrum for each of said ends, a resilient abutment arranged in the head, a stylus bar secured to the inner portion of the head and engaging said abutment, a stylus mounted in the outer portion of the head and engaging said abutment, a vibratory diaphragm, adjustable contacts carried thereby and between which the end of the stylus bar vibrates, and a coiled spring having one end fixed to one of said contacts.

20. A sound box comprising a stylus head, a resilient suspending device for said head said suspension device provided with angularly disposed ends, a fulcrum for each of said ends, a resilient abutment arranged in the head, a stylus bar secured to the inner portion of the head and engaging said abutment, a stylus mounted in the outer portion of the head and engaging said abutment, adjustable tensioning means for said suspending device, a vibratory diaphragm, adjustable contacts carried thereby and between which the free end of the stylus bar vibrates, and a coiled spring having one end fixed to one of said contacts.

21. A sound box comprising a stylus head, a resilient suspending device for said head said suspension device provided with angularly disposed ends, a fulcrum for each of said ends, a resilient abutment arranged in the head, a stylus bar secured to the inner portion of the head and engaging said abutment, adjustable tensioning means for said suspending device, a regulating means carried by the head and engaging with the stylus for retaining it in position, a vibratory diaphragm, adjustable contacts carried thereby and between which the free end of the stylus bar vibrates, and a coiled spring having one end fixed to one of said contacts.

22. A sound box comprising a stylus head, a resilient suspending device for said head said suspension device provided with angularly disposed ends, a fulcrum for each of said ends, a resilient abutment arranged in the head, a stylus bar secured to the inner portion of the head and engaging said abutment, a stylus mounted in the outer portion of the head and engaging said abutment, a vibratory diaphragm having a substantially concavo-convex portion, and a pair of contacts carried by the diaphragm and between which the inner end of said stylus bar vibrates.

23. A sound box comprising a stylus head, a resilient suspending device for said head said suspension device provided with angularly disposed ends, a fulcrum for each of said ends, a resilient abutment arranged in the head, a stylus bar secured to the inner

portion of the head and engaging said abutment, a stylus mounted in the outer portion of the head and engaging said abutment, adjustable tensioning means for said suspending device, a vibratory diaphragm having a substantially concavo convex portion, and a pair of contacts carried by the diaphragm and between which the inner end of said stylus bar vibrates.

24. A sound box comprising a stylus head, a resilient suspending device for said head said suspension device provided with angularly disposed ends, a fulcrum for each of said ends, a resilient abutment arranged in the head, a stylus bar secured to the inner portion of the head and engaging said abutment, a stylus mounted in the outer portion of the head and engaging said abutment, adjustable tensioning means for said suspending device, a regulating means carried by the head and engaging with the stylus for retaining it in position, a vibratory diaphragm having a substantially concavo convex portion, and a pair of contacts carried by the diaphragm and between which the inner end of said stylus bar vibrates.

25. A sound box comprising a stylus head, a resilient suspending device for said head said suspension device provided with angularly disposed ends, a fulcrum for each of said ends, a resilient abutment arranged in the head, a stylus bar secured to the inner portion of the head and engaging said abutment, a stylus mounted in the outer portion of the head and engaging said abutment, a vibratory diaphragm having a part thereof substantially concavo convex in contour, adjustable contacts carried thereby and between which the free end of the stylus bar vibrates, and a coiled spring having one end fixed to one of said contacts.

26. A sound box comprising a stylus head, a resilient suspending device for said head said suspension device provided with angularly disposed ends, a fulcrum for each of said ends, a resilient abutment arranged in the head, a stylus bar secured to the inner portion of the head and engaging said abutment, a stylus mounted in the outer portion of the head and engaging said abutment, adjustable tensioning means for said suspending device, a vibratory diaphragm having a part thereof substantially concavo convex in contour, adjustable contacts carried thereby and between which the free end of the stylus bar vibrates, and a coiled spring having one end fixed to one of said contacts.

27. A sound box comprising a stylus head, a fulcrumed resilient suspending device for said head, a resilient abutment arranged in the head, a stylus bar secured to the inner portion of the head and engaging said abutment and embodying an inner doubled resilient section, a stylus mounted in the outer portion of the head and engaging said abut-

ment, adjustable tensioning means for said suspending device, a regulating means carried by the head and engaging with the stylus for retaining it in position, a vibratory diaphragm having a part thereof substantially concavo convex in contour, adjustable contacts carried thereby and between which the free end of the stylus bar vibrates, and a coiled spring having one end fixed to one of said contacts

28. A sound box embodying a body portion formed of two sections one being dome-shaped, a diaphragm fixed to one of said sections, a diaphragm interposed between said sections and having a part thereof substantially concavo convex in contour, said concave portion of said diaphragm in cross section of greater length than the remaining portion of the diaphragm, a pair of contacts carried by said last mentioned diaphragm, a coiled spring having one end fixed to one of said contacts and the other vibrating freely inside the dome-shaped section of the box, a stylus bar vibrating between said contacts and having an inner end capable of being tensioned, a head connected to one end of the stylus bar, a stylus mounted within said head, a regulating means for securing the stylus in position, and a vibratory suspending device for the stylus head.

29. A sound box embodying a body portion formed of two sections, a diaphragm fixed to one of said sections, a diaphragm interposed between said sections and having a part thereof substantially concavo convex in contour, a pair of contacts carried by said last mentioned diaphragm, a coiled spring having one end fixed to one of said contacts, a stylus bar embodying a doubled resilient inner section vibrating between said contacts, a head connected to one end of the stylus bar, a stylus mounted within said head, a regulating means for securing the stylus in position, and a fulcrumed and vibratory suspending device for said head.

30. A sound box embodying a body portion formed of two sections, a diaphragm fixed to one of said sections, a diaphragm interposed between said sections and having a part thereof substantially concavo convex in contour, a pair of contacts carried by said last mentioned diaphragm, a coiled spring having one end fixed to one of said contacts a stylus bar embodying a doubled resilient inner section vibrating between said contacts, a head connected to outer end of the stylus bar, a stylus mounted within said head, a regulating means for securing the stylus in position, a fulcrumed and vibratory suspending device for said head, and adjustable tensioning means for said suspending device.

31. A sound box comprising a stylus head, a vibratory suspending device therefor, said device consisting of a rectangular strip of

resilient material having angularly-disposed ends, a fulcrum for each angular end of said strip, and adjustable securing means for the strip.

5 32. A sound box embodying a body portion formed of two sections, a stylus head, a vibratory suspension device therefor, said device embodying a strip of resilient material having its ends angularly disposed and
10 tightly drawn, said device further embodying a fulcruming means for said strip and means for adjustably securing the strip to the body portion of the box, a diaphragm interposed between the said sections and having
15 a portion thereof substantially concavo convex in contour, a pair of contacts carried by said last mentioned diaphragm, an actuating coil spring positioned within one of the sections of the box, one end of said spring fixed
20 to one of said contacts and the other end vibrating freely, and a stylus bar having a doubled resilient inner end capable of being placed under tension and vibrating between said contacts.

25 33. A sound box comprising a stylus head, a pair of contacts, a stylus carried by said head, a stylus bar secured to the head and having a resilient inner end capable of being placed under tension, said resilient end vi-
30 brating between said contacts.

34. A sound box comprising a stylus head, a pair of contacts, a stylus carried by said head, a stylus bar secured to the head and having a resilient inner end capable of being
35 placed under tension, said resilient end vibrating between said contacts, one of said contacts constituting means for varying the tension of the resilient end of the stylus bar, thereby regulating the sounds produced by
40 the box.

35. A sound box comprising a stylus head carrying a stylus, a stylus bar formed of a rigid and a resilient section, said rigid section provided with means whereby it can be
45 secured to the stylus head, said resilient section capable of having its tension varied, and a pair of contacts associating with the resilient section of the stylus bar.

36. A sound box comprising a stylus head,
50 a stylus carried thereby, a stylus bar embodying a rigid and a resilient section, said resilient section formed of two flat spring members capable of being placed under tension, and a contact associating with each of
55 said members, one of said contacts being adjustable, whereby the tension of said members can be varied thereby regulating the sound produced by the box.

37. A sound box comprising a stylus head and vibratory suspending device therefor, a
60 stylus carried by the head, a stylus bar having a resilient inner end capable of being placed under tension, means whereby the outer end of the stylus bar can be connected to the stylus head, a pair of contacts asso-
65 ciating with the resilient inner end of the stylus bar, one of said contacts adjustable whereby the tension of the inner end of said stylus bar can be varied thereby regulating the sound produced by the box.

38. A sound box embodying a stylus bar consisting of a rigid and a resilient section, said resilient section formed of a pair of flat spring members having one end fixed to the rigid section, said members capable of being
75 placed under varying degrees of tension.

39. A sound box embodying a stylus bar consisting of a rigid and a resilient section, said resilient section formed of a pair of flat spring members having one end fixed to the
80 rigid section, said members capable of being placed under varying degrees of tension, combined with a stylus carried by said head and a pair of contacts associating with said members, one of said contacts being adjust-
85 able whereby the tension of said members can be varied and the sound produced regulated.

40. A sound box comprising a vibratory diaphragm positioned intermediate the ends
90 of the box and having a part thereof substantially concavo convex in contour, a socket forming member positioned at one side of the diaphragm, an adjustable contact extending through the diaphragm and projecting into
95 the socket formed by said member, an actuating coiled spring fixed to one end of said contact, a contact mounted in said member and extending in the socket, a stylus head, a stylus carried thereby, and a stylus bar com-
100 prising a fixed and a resilient section, said fixed section secured to the stylus head and said resilient section capable of being placed under tension, said resilient section oscillating between said contacts, said adjustable
105 contact providing means whereby the tension of said resilient section can be varied and the sounds reproduced regulated.

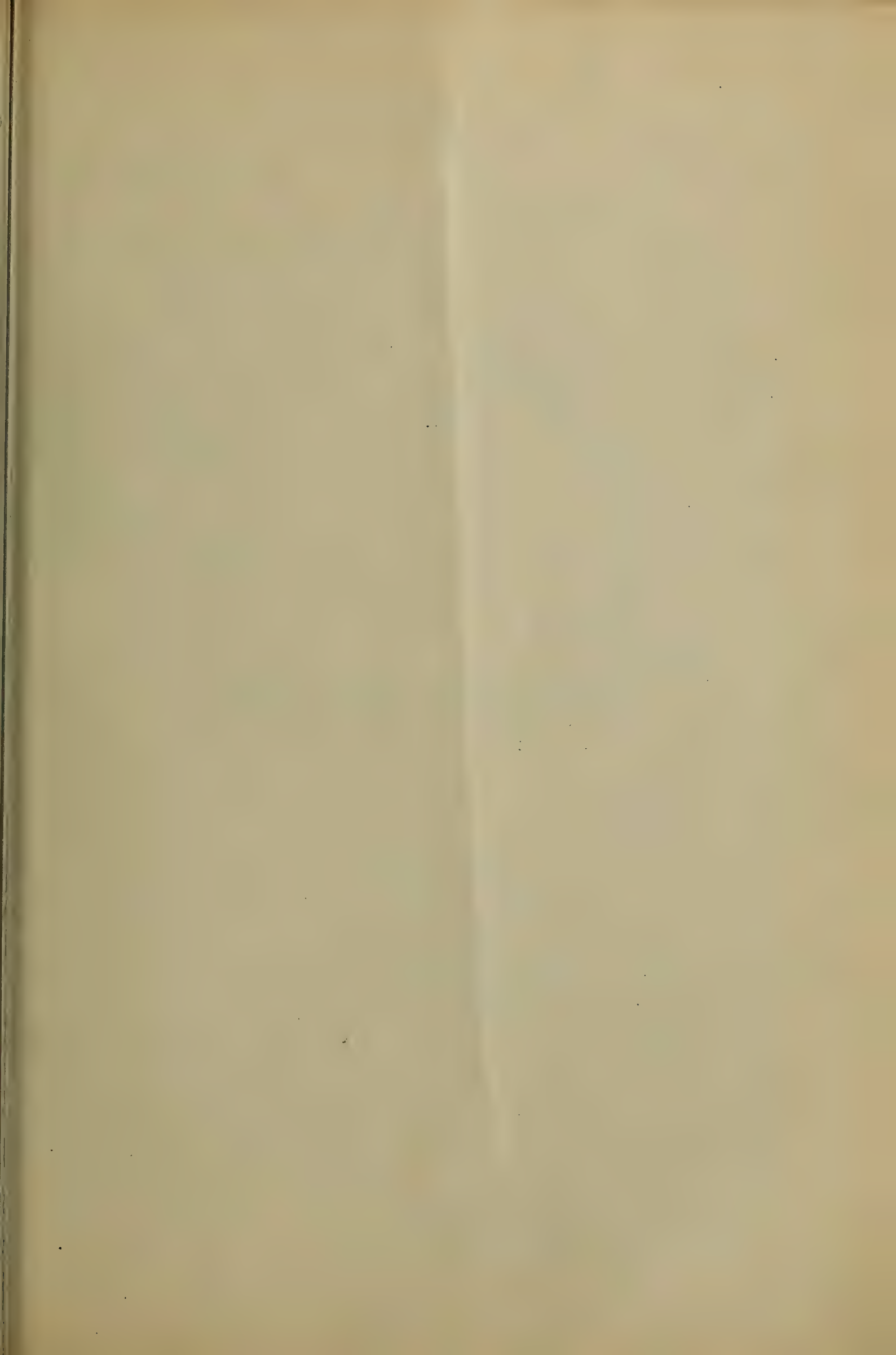
In testimony whereof I have hereunto set my hand in presence of two subscribing wit-
110 nesses.

WILLIAM H. MARTIN.

Witnesses:

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R. B. SMITH.
 AUTOMATIC STOP FOR TALKING MACHINES.
 APPLICATION FILED SEPT. 16, 1908.

906,319.

Patented Dec. 8, 1908.
 2 SHEETS—SHEET 1.

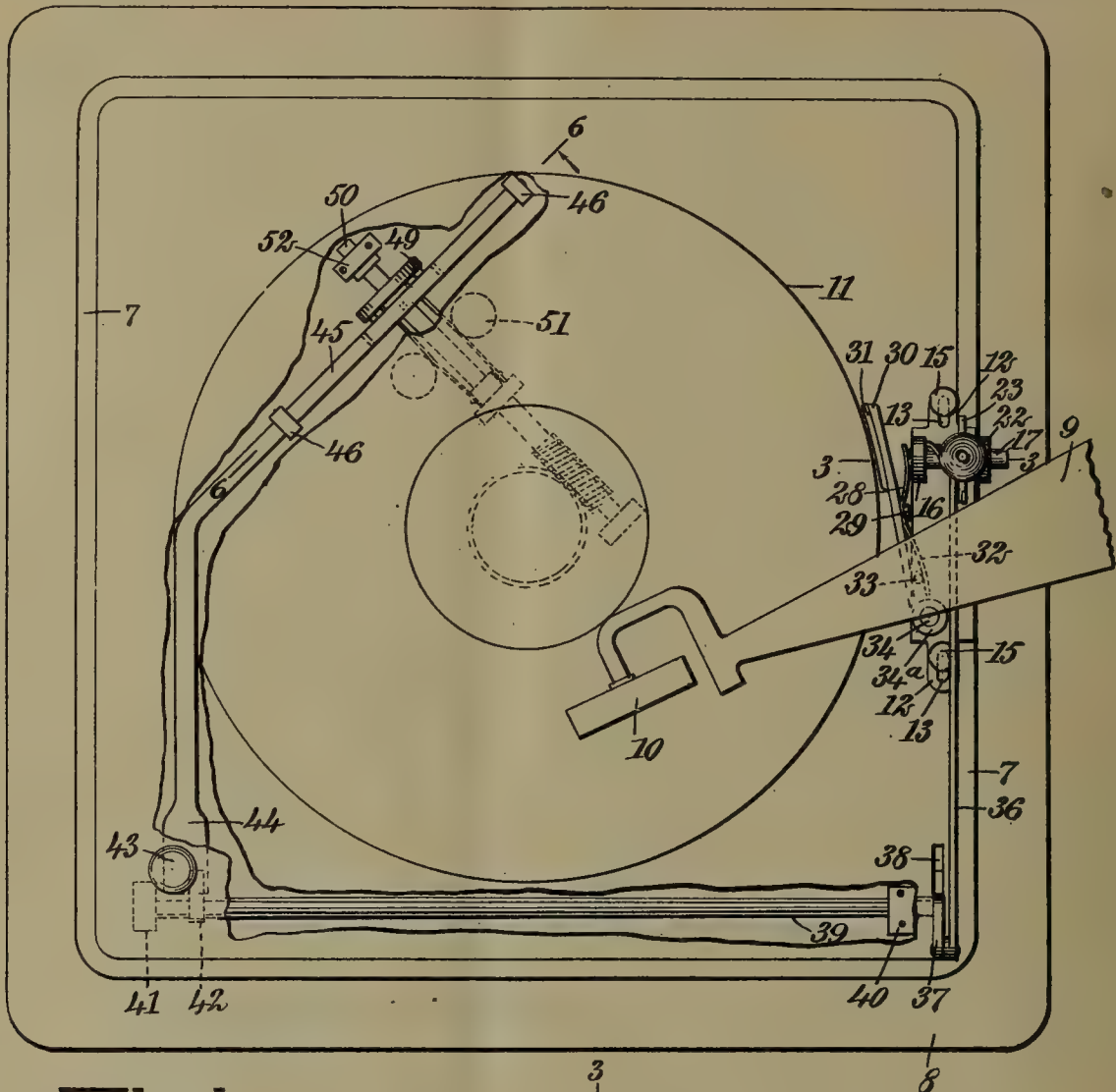


Fig. 1.

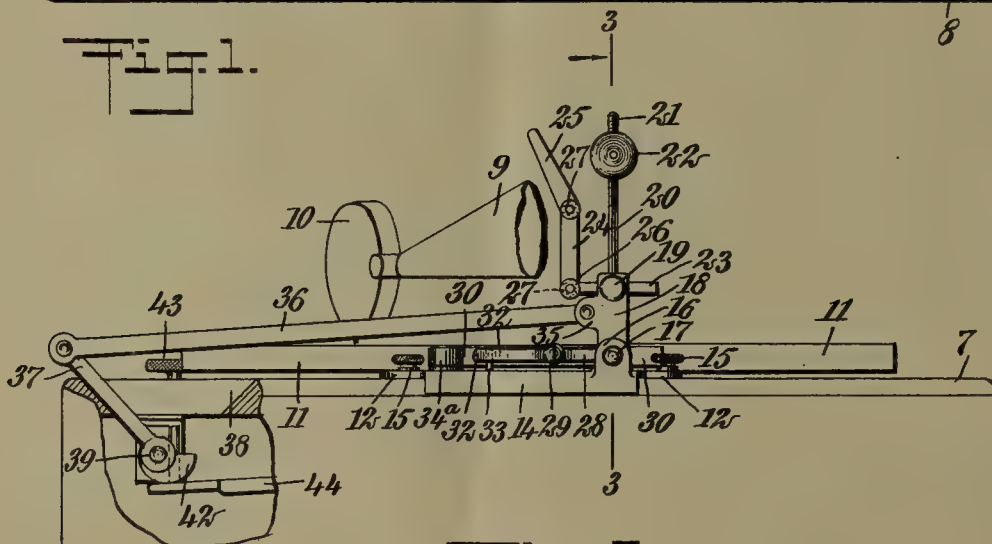
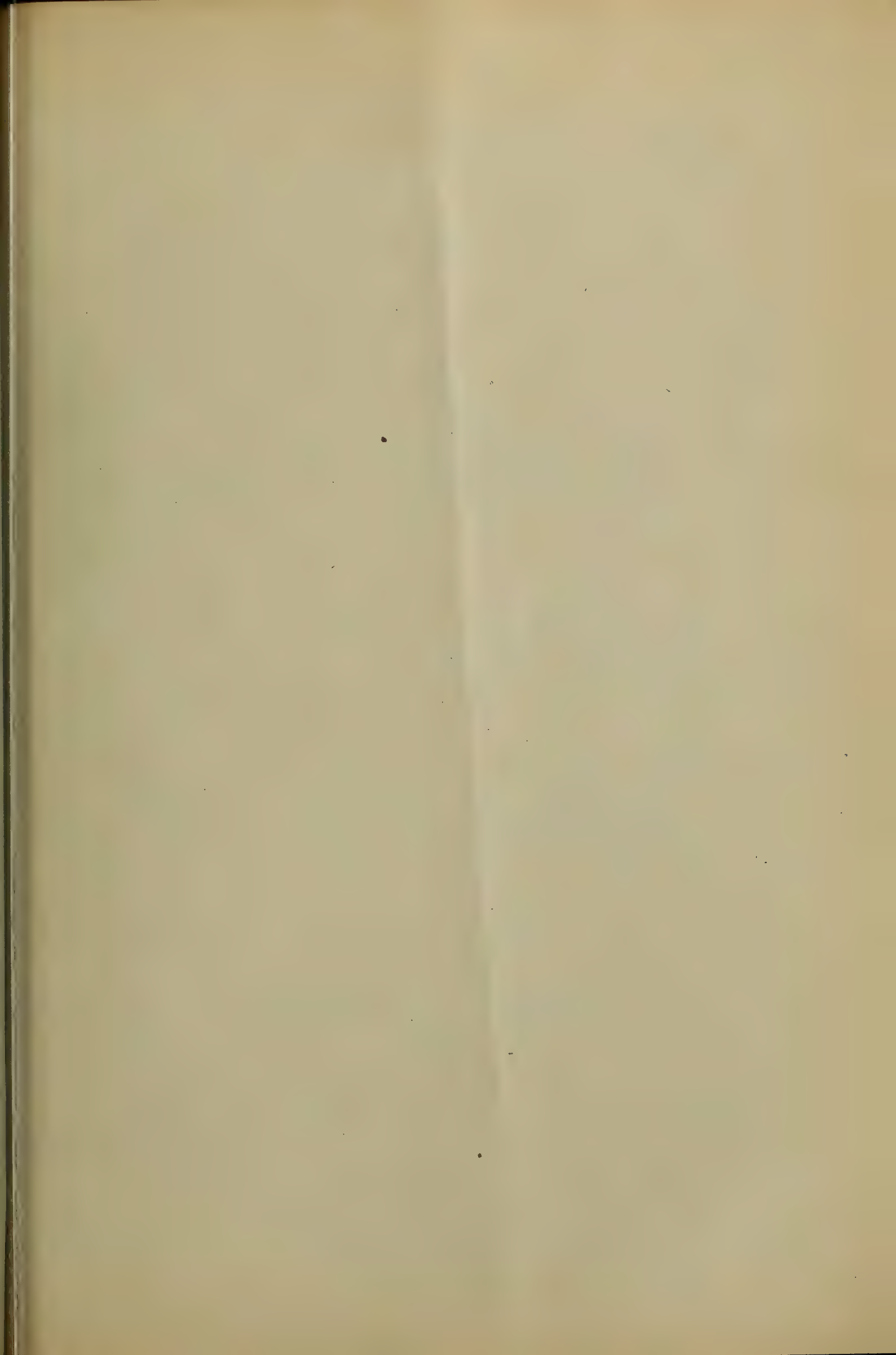


Fig. 2.

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 BY *Mumford*
 ATTORNEYS

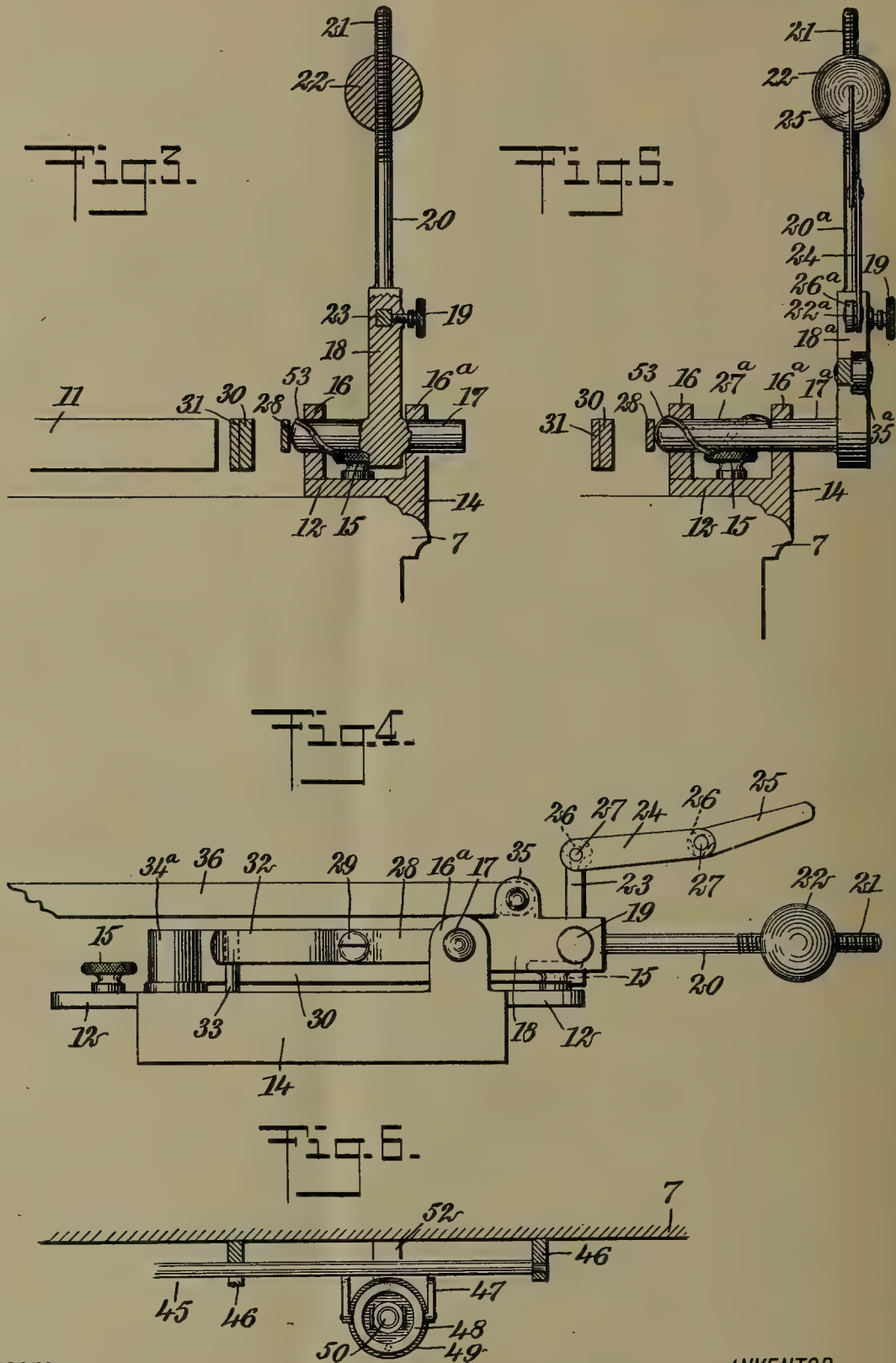


R. B. SMITH.
 AUTOMATIC STOP FOR TALKING MACHINES.
 APPLICATION FILED SEPT. 16, 1908.

906,319.

Patented Dec. 8, 1908.

2 SHEETS—SHEET 2.



WITNESSES
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 ATTORNEYS

UNITED STATES PATENT OFFICE.

RICHARD BARTHOLOMEW SMITH, OF NEW YORK, N. Y.

AUTOMATIC STOP FOR TALKING-MACHINES.

No. 906,319.

Specification of Letters Patent.

Patented Dec. 8, 1908.

Application filed September 16, 1908. Serial No. 453,235.

To all whom it may concern:

Be it known that I, RICHARD BARTHOLOMEW SMITH, a subject of the King of Great Britain, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Automatic Stop for Talking-Machines, of which the following is a full, clear, and exact description.

My invention relates to talking machines, my more particular purpose being to enable a moving member carried by the machine and having a travel related to the progress made by the record in play, to act upon and operate one or more brakes for the purpose of stopping the machine promptly when the playing of the record is completed.

While for the sake of simplicity I show my invention as applied to an ordinary talking machine of the Victor type, it will be understood that I do not limit myself, for the reason that my invention may be applied to any other type of talking machine.

Briefly stated, my invention contemplates the use of a brake to be applied directly to the rotary disk or equivalent member supporting the record, and a weight controllable by a movement of the horn and adapted to be tripped when the horn reaches a point representing the end of the performance, that is, the finish of the music or other production, so that the brake is applied promptly as the performance is finished, the point of stoppage being, to some extent, independent of whether the performance be long or short for a given size record.

My invention further contemplates an auxiliary brake to be operated in connection with the governor mechanism, for the purpose of applying to the latter a braking action independent of the braking action exerted upon the disk or its equivalent, and in this manner to enable the entire machine to be stopped positively because of the cumulative action of two separate brakes related mechanically to each other.

My invention further comprehends certain adjustments of parts incidental to carrying out the purposes above mentioned.

In addition, my invention contemplates various constructional improvements whereby the general efficiency of the talking machine, and particularly the brake and governor mechanism thereof, is greatly improved.

Reference is to be had to the accompany-

ing drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a fragmentary plan of a disk talking machine equipped with my invention, this view showing a disk, my improved brake for gripping the edge thereof and designated by me as the "main brake", a gravity-controlled trip for actuating this brake, and further showing the governor mechanism together with an auxiliary brake for stopping movement of the latter, this auxiliary brake being connected by various movable parts with the main brake and controllable therewith as a unit by the gravity-controlled trip; Fig. 2 is a fragmentary side elevation showing the gravity-controlled trip and the movable horn of the machine, as adapted to actuate this trip, for the purpose of controlling the brake mechanism; Fig. 3 is an enlarged fragmentary section upon the line 3—3 of Fig. 2, looking in the direction of the arrow, showing the gravity-controlled trip used for the purpose of actuating the brakes; Fig. 4 is a fragmentary side elevation of the mechanism shown in Fig. 3; Fig. 5 is a view somewhat similar to Fig. 3, but showing a slightly modified form of gravity-controlled trip mechanism; and Fig. 6 is a fragmentary section upon the line 6—6 of Fig. 1, looking in the direction of the arrow, and showing the auxiliary brake for the governor mechanism.

The casing of a talking machine is shown at 7, the base of the machine at 8, the movable horn at 9, and the reproducer at 10, the reproducer being carried by the horn. These parts move in the usual manner over a revoluble disk 11 upon which the disk record is to be mounted. A plate 12 is provided with slots 13 (see Fig. 1) and is slidably mounted upon the top of the casing 7 at a point adjacent to the edge thereof. This plate is provided with a downwardly extending portion 14 which partially overhangs the edge of the casing, as will be understood from Fig. 3. This increases the security of the plate 12 relatively to the casing 7. Screws 15 extend through the slots 13 and these bind the plate upon the casing. These screws, however, permit the plate to be adjusted in the general direction of its length, as will be understood from Fig. 1.

The plate 12 is provided with bearings 16, 16^a which support a stub shaft 17, the latter

having a limited movement both axially and radially. Extending upwardly from the stub shaft 17 is an arm 18, and extending into this arm is a screw 19. Extending from the arm 18, and forming practically a continuation of the same, is a rod 20 having a threaded portion 21, and mounted upon this threaded portion is a spherical weight 22 threaded internally for the purpose. This spherical weight, by being rotated upon the rod 20, is adjusted relatively to the general length of the latter, and in this way can exert greater or lesser leverage upon the stub shaft 17 as a center.

An arm 23 extends directly through the arm 18 and is adjustable relatively to the latter. The arm 23 is normally held rigid in relation to the arm 18 by aid of the screw 19. In order to adjust the position of the arm 23 relatively to the arm 18, the screw 19 is loosened by hand, being tightened after the adjustment is completed. A bar 24 is supported by the arm 23, and extending from this bar is another bar 25. The bars 24, 25 are connected together and the bar 24 is connected with the arm 23 by aid of pivot pins 27.

Star springs 26 are provided for the purpose of producing a gentle friction between the bars 24, 25 and the arm 23. These parts 23, 24, 25 thus together constitute a member having more or less rigidity, but sufficiently flexible to be bent into slightly different positions. A leaf spring 28 engages the stub shaft 17. This leaf spring is connected by a screw 29 with a brake lever 30, the latter carrying a brake shoe 31 which may be pressed into engagement with the edge of the disk 11. The leaf spring 28 is provided with a portion 32 which presses against a stop pin 33 carried by the plate 12. The brake lever 30 is mounted upon the plate 12 by aid of a pivot pin 34, and for this purpose is provided with a cylindrical bearing 34^a encircling said pin.

The arm 18 carries a lug 35 and pivoted to the same is a pitman 36. This pitman is pivoted to an arm 37 which extends through a slot 38 in the top of the casing 7. The arm 37 is connected rigidly with a rocking shaft 39 which is journaled in hangers 40, 41, the latter being secured to the top of the casing. A cam 42 is mounted rigidly upon the rocking shaft 39. A screw bolt 43 extends through the top of the casing and is disposed adjacent to the cam 42. A crank arm 44 extends below the screw bolt 43 and the cam 42. This arm is connected rigidly with a shaft 45 and constitutes practically a continuation of the latter, as will be understood from Fig. 1, so that a vertical movement of the arm or crank 44 necessitates a slight rocking movement of the shaft 45. This shaft is supported by hangers 46 mounted upon the under side of the casing

top. Depending from this shaft are arms 47 (see Fig. 6) and swiveled upon these arms is a ring 48 which engages a friction plate 49, the latter being mounted upon a shaft 50. This shaft is part of a governor 51 and is journaled in a hanger 52. Whenever the crank arm 44 is slightly depressed, so as to rock the shaft 45, the arms 47 (Fig. 6) force the ring 48 into engagement with the friction disk 49, and this stops rotation of the governor 51 if the pressure upon the arm 44 be sufficiently hard, but if the pressure upon said arm be easier, the governor is simply slowed up without being stopped. Hence, by turning the screw bolt 43 slowly and within proper limits, the speed of the governor 51 may be regulated by hand, whereas if the cam 42 suddenly thrusts the crank arm 44 abruptly downward, the pressure of the ring 48 against the friction disk 49 brings the governor to an abrupt stop in its rotation.

Formed upon the stub shaft 27 is a thread 53. This thread works in the bearing 16 which is so formed as to receive it. When, therefore, the stub shaft 17 is rocked slightly by aid of the weight 22, the stub shaft moves a little in the general direction of its axis, and by pressing against the leaf spring 28 forces the brake arm 30 toward the disk 11, so that the shoe 31 engages this disk and stops its rotation.

In Fig. 5 I show, at 17^a, a slightly different form of stub shaft. Mounted upon one end of the latter is an arm 18^a, and extending from this arm is a rod 20^a upon which the spherical weight 22 is mounted, as elsewhere described. Mounted also upon the arm 18^a is an arm 26^a corresponding to the arm 23 shown in Fig. 3. The rods 22^a, 25 are connected together and mounted upon the arm 26^a in practically the same manner that the rods 25, 24 are connected together and mounted upon the arm 23. Similarly, the arm 18^a carries a lug 35^a, corresponding to the lug 35 elsewhere described.

If it be desired to operate the talking machine without the use of my improved mechanism, the spherical weight 22 is placed in the position indicated in Fig. 3. When in this position, the weight and all parts controllable by it simply remain inactive. Suppose, however, that it be desired at any time to bring into use my improved mechanism. The rods 24, 25 are moved relatively to each other and to the arm 23 so that the rod 25 approaches, to a greater or a lesser degree, as desired, the rod 20 and the spherical weight 22. The purpose of moving the rods 24, 25 relatively to the rod 20 and weight 22 is to enable the horn 9, in its travel across the disk 11, to be brought into engagement with the rods 24, 25 at the proper instant relatively to the progress of the performance of the record being played. For instance,

if the performance be very short so that but little of the surface of the disk contains record matter, the playing is soon terminated and it is desirable to stop the machine comparatively early. If, however, the duration of the record is quite long, it is desirable that the engagement of the horn 9 with the rods 24, 25 shall be delayed. Because of differences in the length of the performance, the horn 9 should sometimes move nearly to the center of the disk 11, and at other times need not move so near the center of said disk in order to reach a point representing the termination of the performance for the particular record being played. The operator, already knowing whether the record be long or short, and having previously determined the point at which the horn 9 should arrive when the performance of the record is completed, adjusts the rods 24, 25 accordingly, and, if need be, also adjusts the arm 23 by aid of the screw 19. The operator having effected these adjustments, or either of them, now raises the rod 20 into vertical position, as indicated in Fig. 2. The spherical weight 22 is thus rested in stable equilibrium, but is very easily overthrown. The machine is now wound up and started in the manner well known in the art. As the playing of the record nears completion, the horn 9 approaches the rods 24, 25. The rod 25 can be given any desired angle relatively to the rod 24, and is therefore engaged by the horn 9 at any desired angle, as will be understood from Fig. 1. The horn having finished its travel, the rods 24, 25 and the arm 23 (together constituting a lever) rock the stub shaft 17 or 17^a, and the weight 22 falls to the right, according to Fig. 4. This removes the rods 24, 25 out of engagement with the horn 9 and the rotation of the stub shaft 17 (or 17^a, as the case may be) causes the spring 28 to move the brake lever 30 and this forces the shoe 31 into engagement with the disk 11, thus applying the main brake. The movement of the arm 18 causes the pitman 36 to travel in the general direction of its length, thus rocking the arm 37, shaft 39 and cam 42. The cam, upon being thus moved, forces the adjacent end of the crank arm 44 slightly downward, thereby rocking the shaft 45 and applying the auxiliary brake to the governor mechanism. The machine is thus stopped by action of the main brake, assisted by the action of the auxiliary brake.

I find that the application of two separate brakes to different parts of the machine, such different parts moving at different speeds, enables the machine to be stopped with a minimum of shock or jar and with great positiveness. It will be noted that the machine, if running and left alone, will work in such manner that both brakes are applied automatically and are left in such

condition that the machine can not readily be started into action by any accidental cause. The adjustment of the plate 12 relatively to the screws 15 is for purposes of accommodating the machine to disks of different size, and also disks in which the record surface may vary as to its distance from the edge or from the center of the disk.

The brake arm 30 is readily detachable. To remove this arm, it is simply detached from the pivot pin 34. This being done, the auxiliary brake alone is free to act. To use the main brake alone, the brake arm 30 is left in position, and the auxiliary brake is thrown out of action by disconnecting the pitman 36. I therefore use either the main brake alone, the auxiliary brake alone, or both brakes together, or neither brake, as desired.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a talking machine, the combination of a revoluble member for carrying a record, a governor for controlling the speed of said member, a main brake for stopping the travel of said member, an auxiliary brake for stopping the travel of said governor, and means co-acting with the travel of said revoluble member for applying both of said brakes.

2. In a talking machine, the combination of a revoluble member for supporting a sound record, a brake for stopping the rotation of said revoluble member, a weight for actuating said brake, and means for adjusting said weight in different positions for the purpose of controlling the degree of force exerted by said brake.

3. In a talking machine, the combination of a member for supporting a sound record, a brake for stopping rotation of said sound record, a rocking shaft mounted in bearings and provided with a thread engaging one of said bearings for the purpose of thrusting said rocking shaft against said brake, a weight for actuating said rocking shaft, and means co-acting with said revoluble member for releasing said weight.

4. In a talking machine, the combination of a revoluble member for supporting a sound record, a governor for controlling the speed of said sound record, a main brake for stopping the rotation of said revoluble member, an auxiliary brake for stopping the rotation of said governor, and a connection from said main brake to said auxiliary brake for enabling both of said brakes to act as a unit.

5. In a talking machine, the combination of a revoluble member for supporting a sound record, a governor for controlling the speed of said revoluble member, a main brake for stopping the rotation of said revoluble member, an auxiliary brake for stop-

ping the rotation of said governor, connections from said main brake to said auxiliary brake for enabling both of said brakes to act as a unit, and mechanism co-acting with said
 5 revoluble member for actuating said brakes.

6. In a talking machine, the combination of a revoluble member for supporting a sound record, a governor, a brake for said revoluble member, a brake for said governor,
 10 mechanism for actuating said brakes simultaneously, and means controllable at will for throwing either of said brakes out of action.

7. In a talking machine, the combination of a revoluble member for supporting a
 15 sound record, a main brake for stopping the rotation of said revoluble member, an auxiliary brake co-acting with said main brake for quickening the time of stoppage of said revoluble member, and means controllable at
 20 will for throwing either of said brakes out of action.

8. In a talking machine, the combination of a main brake, an auxiliary brake, means controllable at will for throwing either of
 25 said brakes out of action, as desired, and a revoluble member controllable by said brakes and adapted to support a sound record.

9. In a talking machine, the combination of a main brake, an auxiliary brake, means
 30 controllable at will for throwing said brakes out of action independently; and mechanism co-acting with said brakes and adapted to support a sound record.

10. In a talking machine, the combination
 35 of a revoluble member for supporting a record, a governor for controlling the speed of said revoluble member, a main brake for stopping the rotation of said revoluble member, an auxiliary brake for stopping the
 40 rotation of said governor, connections from said main brake to said auxiliary brake for enabling said brakes to act as a unit, a traveling member co-acting with said revoluble member, and a movable weight con-
 45 nected with said brakes for actuating the same, said weight being delicately poised in the path of said traveling member in order to be released by movements of the latter for the purpose of actuating said brakes.

50 11. In a talking machine, the combination of a revoluble member for supporting a record, a horn movable relatively to said revoluble member, a brake, mechanism connected with said brake and controllable by
 55 movements of said horn for setting said brake, said mechanism including a weight mounted upon said arm, and means for adjusting said weight relatively to said arm for the purpose of controlling the sensitive-
 60 ness of said brake.

12. In a talking machine, the combination with a revoluble member for supporting a

sound record, a traveling member in operative relation to said revoluble member, a brake controllable by said traveling mem- 65
 ber, means including a weight for actuating said brake, mechanism for adjusting said weight in different positions for the purpose of controlling the sensitiveness of the
 70 said brake, and means independent of said weight and controllable at will for further increasing the sensitiveness of said brake.

13. In a talking machine, the combination of a revoluble member for supporting a
 75 sound record, a governor for controlling the speed of said revoluble member, mechanism adjustable at will for regulating the speed of said governor, brake mechanism coacting with said revoluble member and
 80 said governor for stopping the rotation of said revoluble member and said governor, and means for actuating said brake mechanism.

14. In a talking machine, the combination of a revoluble member for supporting a
 85 sound record, brakes for stopping the rotation of said revoluble member, a governor, a brake for stopping the rotation of said governor, a traveling member coacting with
 90 the movements of said revoluble member, and mechanism connected with said traveling member for applying both of said brakes.

15. In a talking machine, the combination of a main brake, an auxiliary brake, a revoluble member for supporting a sound rec- 95
 ord, a traveling member coacting with said revoluble member, and means controllable by said traveling member and connected with both of said brakes for setting the lat-
 100 ter when said record is rotated to a predetermined extent.

16. In a talking machine, the combination of a revoluble member for supporting a
 105 sound record, a traveling member coacting with the movement of said revoluble member, a brake for stopping said revoluble member, an arm connected to said brake for actuating the same, a spiral cam mounted upon said arm and provided with a portion
 110 for engaging said brake, a weight mounted upon said arm and adjustable relatively to the same, and a member connected with said arm and disposed within the path of travel
 115 of said traveling member for the purpose of turning said arm and causing said brake to be set.

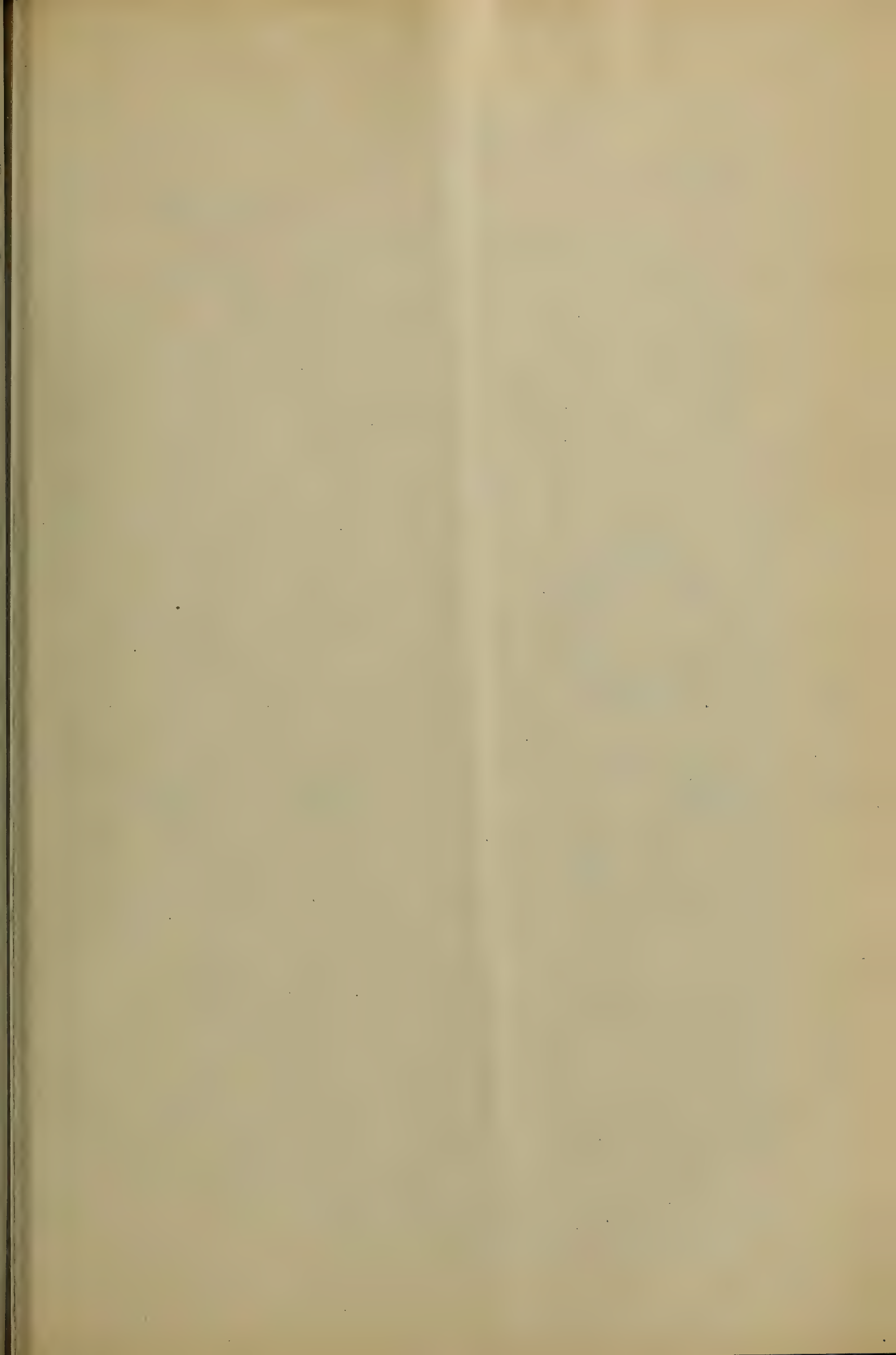
In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RICHARD BARTHOLOMEW SMITH.

Witnesses:

WALTON HARRISON.

JOHN P. DAVIS.

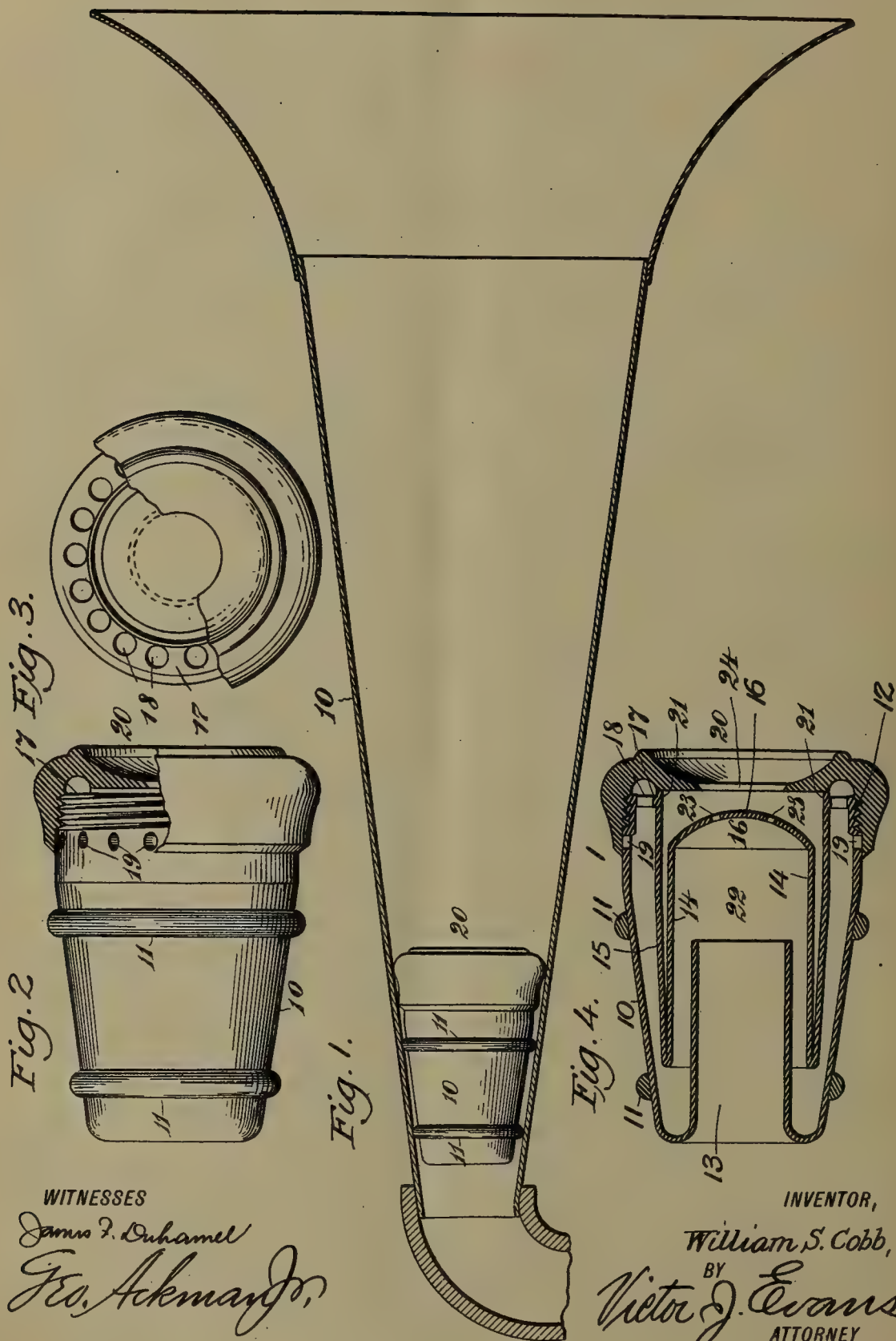


W. S. COBB.
SOUND REGULATOR.
APPLICATION FILED AUG. 19, 1908.

906,388.

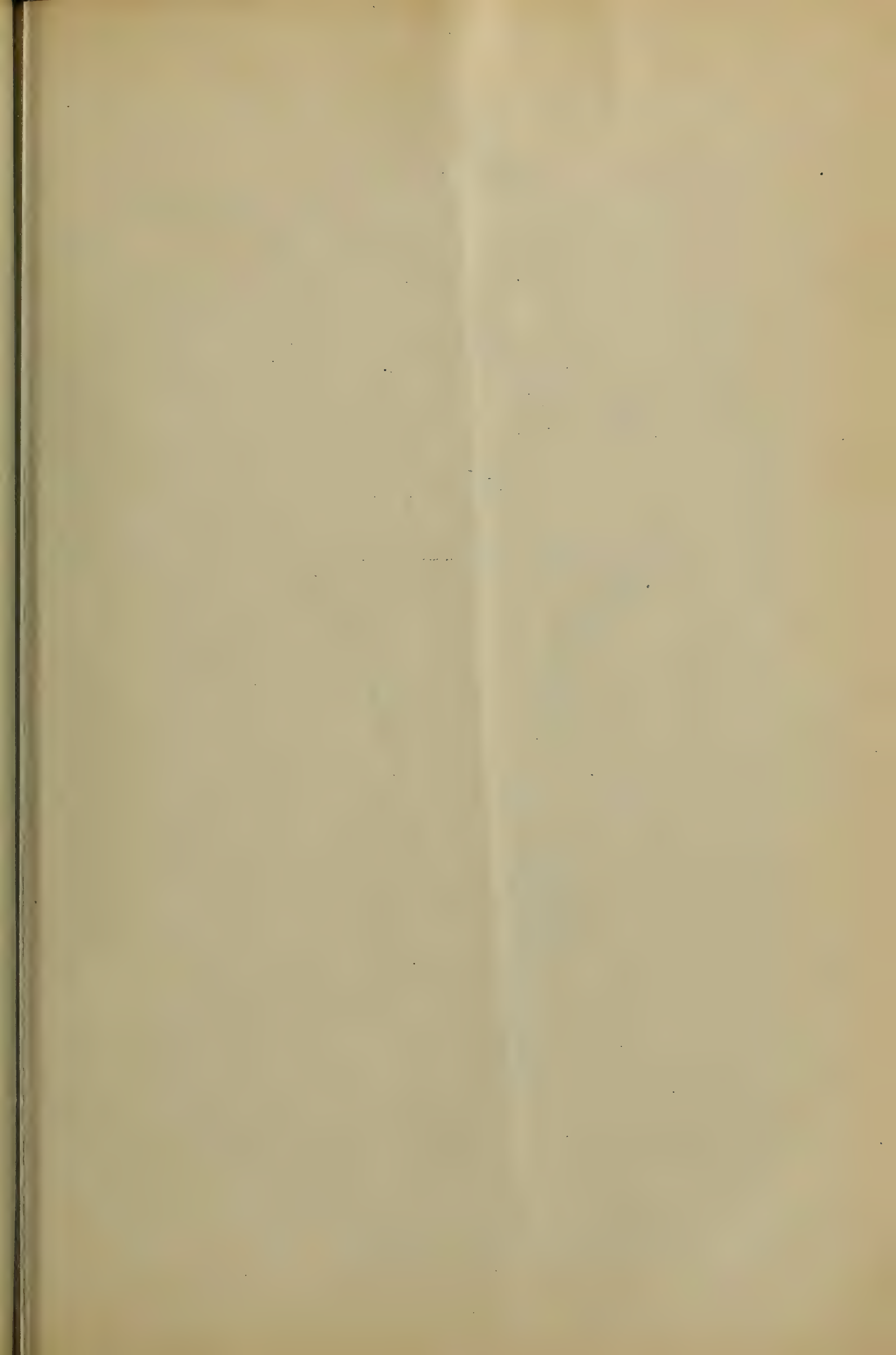
Patented Dec. 8, 1908.

2 SHEETS—SHEET 1.



WITNESSES
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Geo. Ackman, Jr.

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William S. Cobb,
BY
Victor J. Evans
ATTORNEY

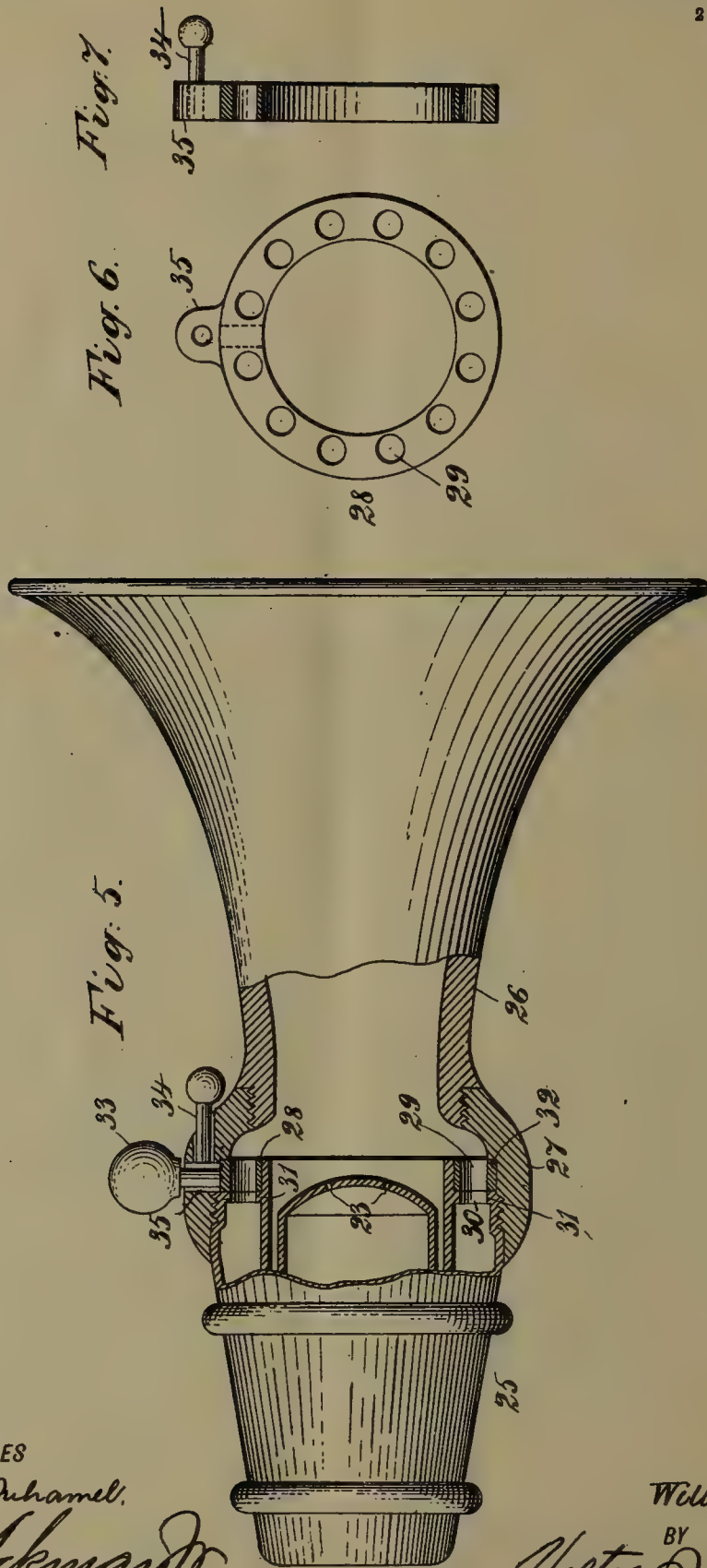


W. S. COBB.
SOUND REGULATOR.
APPLICATION FILED AUG. 19, 1908.

906,388.

Patented Dec. 8, 1908.

2 SHEETS—SHEET 2.



WITNESSES
James F. Duhamel,
Geo. Akman Jr.

INVENTOR,
William S. Cobb,
BY
Victor J. Evans
ATTORNEY

UNITED STATES PATENT OFFICE.

WILLIAM S. COBB, OF FLUSHING, NEW YORK.

SOUND-REGULATOR.

No. 906,388.

Specification of Letters Patent.

Patented Dec. 8, 1908.

Application filed August 19, 1908. Serial No. 449,269.

To all whom it may concern:

Be it known that I, WILLIAM S. COBB, a citizen of the United States, residing at Flushing, in the county of Queens and State of New York, have invented new and useful Improvements in Sound-Regulators, of which the following is a specification.

This invention relates to sound regulators and is placed in the horn or sound outlet of musical instruments, phonographs or talking machines for the purpose of reducing and regulating the volume of sound produced, and to improve the quality of said tones produced in the instrument or machine and to eliminate as far as possible, the objectionable and noisy features produced in the same, as will be more fully described in the following specification set forth in the claims and illustrated in the drawings, where:

Figure 1 is a sectional view of the horn of a talking machine with the improved regulator located therein. Fig. 2 is a side elevation of the regulator partly in section. Fig. 3 is a front view with certain parts broken away. Fig. 4 is a longitudinal sectional view. Fig. 5 shows a modified form. Figs. 6 and 7 are detail views of the latter form.

This regulator may be used in the horn of any phonograph or talking machine or it may be embodied in or made a part of same or of the horn elbow. The horn may be dispensed with entirely and the device used alone instead. It may be constructed of wood or metal but preferably of hard rubber.

The outer shell 10 has tapering sides corresponding with the funnel shaped horn commonly used in talking machines to fit within the same or to cause the device to act as a plug so it may be fitted in a musical instrument and in order to secure the same and effect a perfect closure so that the sound waves will pass through the regulator only it is provided with soft rubber rings 11. The outer end of this shell has screw threads 12 while the inner end is turned forward to form a cylindrical throat 13.

Within the space between the shell 10 and the throat 13 is an inner shell made up of two substantial cylindrical pieces 14 and 15 the former having a perforated end wall 16 preferably concave while the two pieces are united at the other end. The front end of the piece 15 is connected with the shell 10 and a ring 17 having a series of holes 18, is

interposed at that point and unites them. The shell 10 also has at its front end the perforations 19 and on the front end of the device is screwed a regulating cap 20 whose inner face is adapted to fit against the annular lip 21 of the piece 15 when the cap is closed down to its limit on the outer shell. When this regulator is placed in the horn of a talking machine or other instrument the rubber rings 11 effectually close the passage and the only escape for the sound waves is through the throat 13 and into the chamber 22 of the cylinder 14 from whence a limited volume escapes through the perforations 23 in the wall or head 16 and out the opening 24 in the cap 20. In case it is desired to obtain a greater volume the cap is removed from its seat on the lip 21 by unscrewing it so that the surplus sound waves which do not pass through the perforations 23 may move through the passages between the throat 13 and the piece 14 and between the piece 15 and the shell 10, through the holes 18 and out of the opening 24.

In the modified form shown in Fig. 5 the shell 25 is similar in construction to that above described but it carries the horn 26 at its forward end, the shell being interposed between the talking machine and the horn and connected with the latter by a coupling ring 27 threaded for attachment to the two parts. At the outer end of the shell is a ring 28 with a series of perforations, 29 which are adapted to coincide with similar perforations 30 in the front wall 31 of the shell. The ring 28 is movable about the front end of the shell, being held thereon by means of the shoulder 32 of the ring 27, and is shifted by the knob 33 attached directly and radially to the ring or with the pin 34 projecting from a lug 35 on the ring and through the slot 36 in the ring. When it is desired to reduce the volume of sound waves passing through this latter form of regulator the ring is shifted on its seat so that the holes 29 are removed from their coincidence with the holes 30, more or less as desired and by shifting the ring so that its holes are covered by the solid intervals of the wall 31 the sound waves are entirely shut off, except through the perforations 23. Both of these methods of shutting off or reducing the sound waves permit of a very delicate adjustment of the regulator and the latter form especially affords access to the

adjusting parts so that musical selections may be accentuated and emphasized with little trouble.

It is obvious that other means may be adopted to open or close the perforations in the front wall of the adjuster without departing from the essential features which are hereinafter claimed.

What I claim as new and desire to secure by Letters Patent is:

1. In a sound regulator, the combination with the horn, of a musical instrument or talking machine, of a plug conforming in shape with the interior of the horn and comprising two shells with sound passages between them and a regulator rotating on the end of same.

2. In a sound regulator, the combination with a horn adapted to disseminate sound waves, of a plug with forward and reverse passages for the sound waves and a rotating regulator at one end of the plug.

3. In a sound regulator, the combination with a horn for disseminating sound waves, of a series of shells forming tortuous passages and having perforations at their forward end, and a rotating end to regulate the size of the perforations.

4. In a sound regulator, the combination with a horn for distributing sounds, of a

plug made up of shells inclosing winding passages for the sound waves and open at the receiving end and having perforations at the distributing end, and a head adapted to be screwed on the latter end to limit the size of the perforations.

5. In a sound regulator, the combination with a sound distributing horn, of a set of shells inclosing tortuous passages connected at the front end, open at the rear end and having perforations at the point of connection, and a head with an opening adapted to be adjusted on the shells so as to regulate the volume of the sound waves leaving the perforations.

6. In a sound regulator, the combination with a sound distributing horn, of a shell with a throat at its inner end, a second shell within the first and having perforations at its outer end, a perforated ring uniting the two rings at their outer ends, and means at the front ends of the shells to open or close the perforations in the ring.

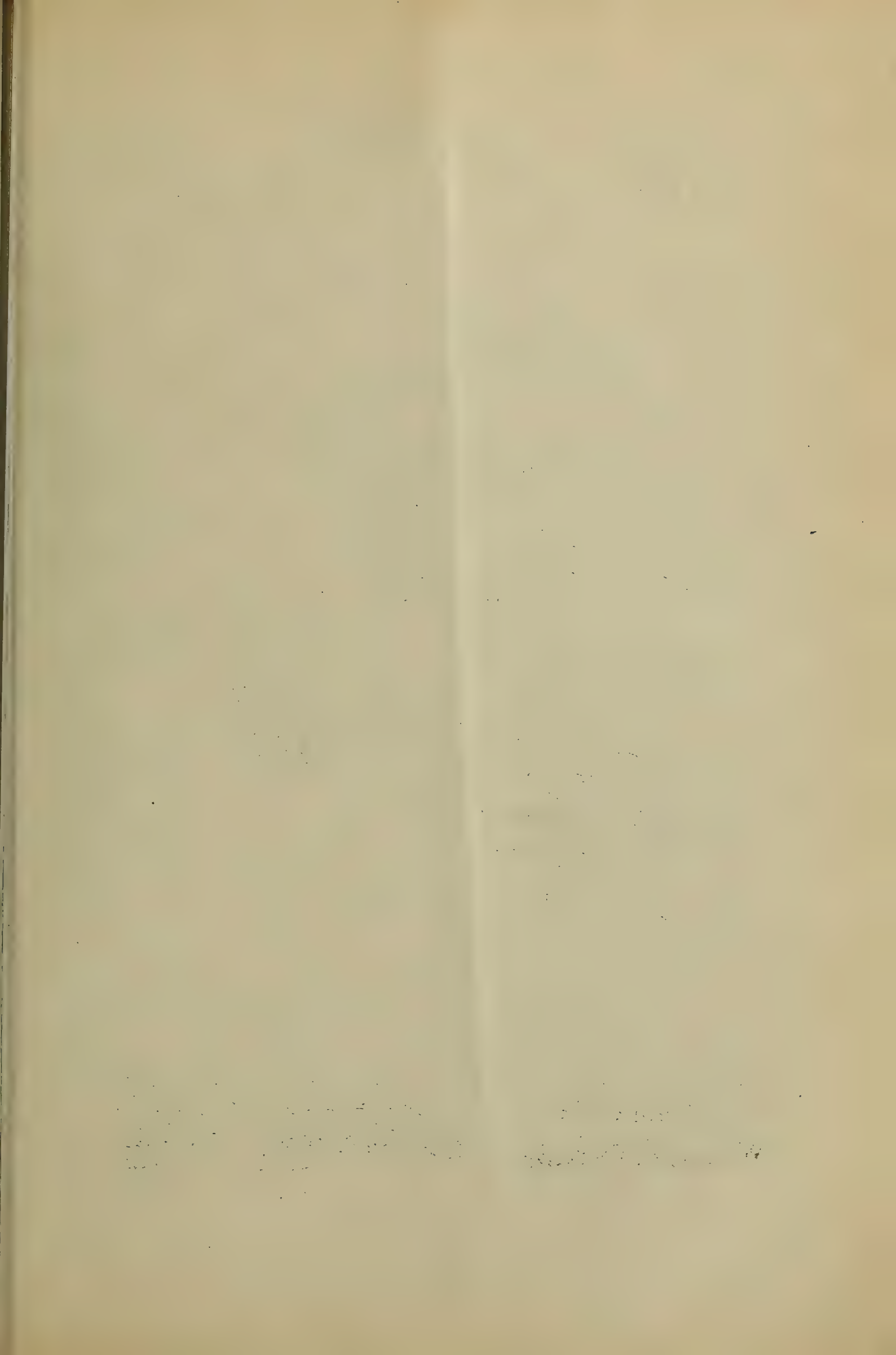
In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM S. COBB.

Witnesses:

JOHN M. MOE,

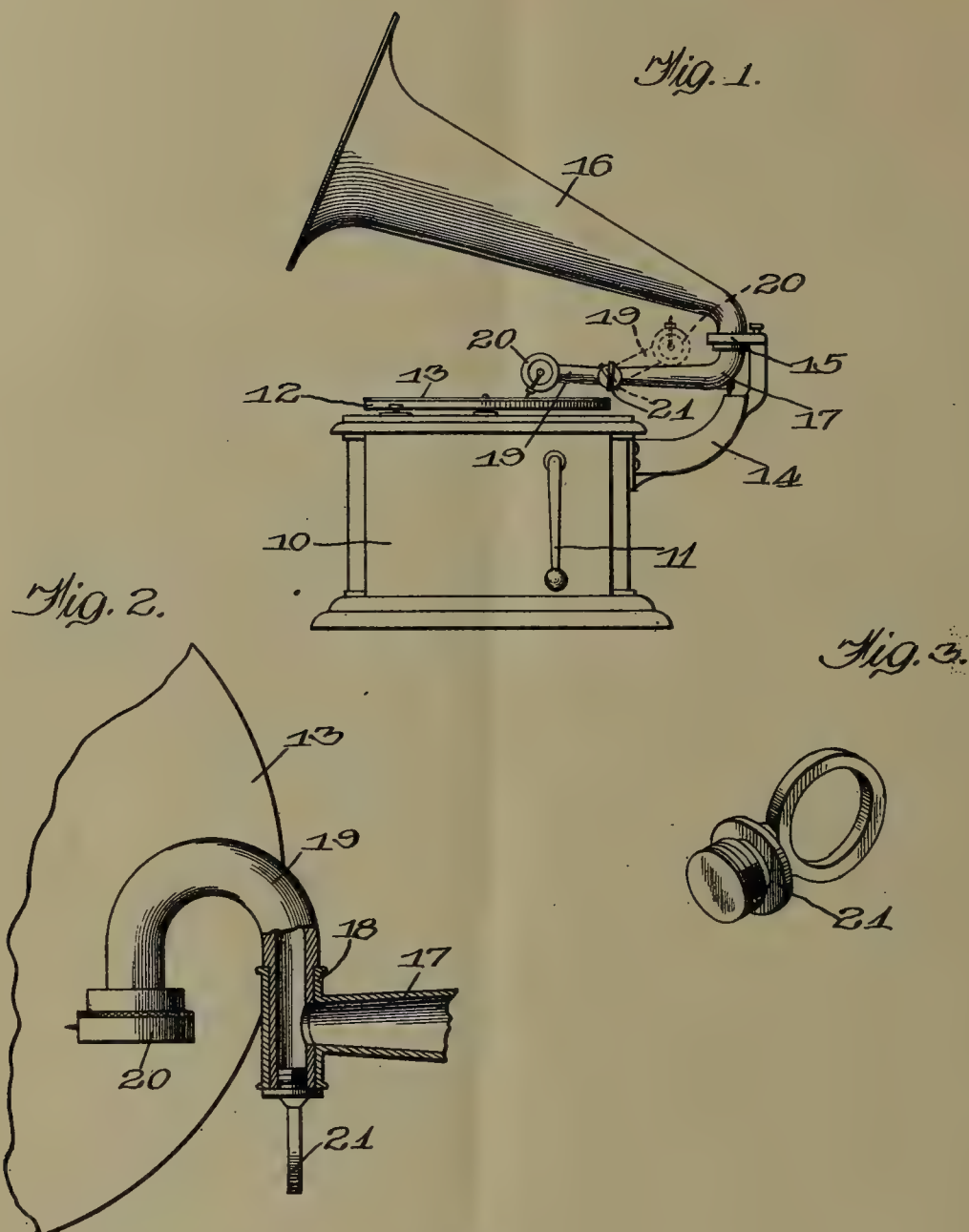
LESTER S. PARMENTER.



H. H. TAYLOR.
TALKING MACHINE.
APPLICATION FILED FEB. 26, 1908.

906,469.

Patented Dec. 8, 1908.



Witnesses:
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William H. DeBusk

Inventor:
H. H. Taylor
By Bond, Adams, Pickens & Jones
Attys.

UNITED STATES PATENT OFFICE.

HORACE H. TAYLOR, OF SAN JOSE, CALIFORNIA, ASSIGNOR OF ONE-HALF TO HIMSELF, AND ONE-HALF TO JOSEPH PEARSE, OF OAKLAND, CALIFORNIA.

TALKING-MACHINE.

No. 906,469.

Specification of Letters Patent.

Patented Dec. 8, 1908.

Application filed February 26, 1908. Serial No. 417,852.

To all whom it may concern:

Be it known that I, HORACE H. TAYLOR, a citizen of the United States, residing at San Jose, in the county of Santa Clara, State of California, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to talking machines, and has for its object to provide a new and improved construction by means of which the sound-box may be more easily and better applied to and lifted off from the record upon which it rests, and by which the operator is enabled better to insert in the sound-box the usual needle. Heretofore it has been customary for the operator to take hold of the sound-box itself in these operations. While this has no bad effect if carefully and properly done, yet injury either to the fingers of the operator or to the instrument, or to both, very often occurs,—for example, when it becomes necessary to remove the sound-box quickly from the record to prevent injury to the instrument,—in which cases the needle sometimes causes painful or even dangerous injuries, or the mica diaphragm is broken or the sound-box otherwise injured or thrown out of adjustment.

The means I have provided for accomplishing the objects mentioned and for avoiding the difficulties heretofore experienced, are illustrated in the drawings and herein-after specifically described.

That which I believe to be new will be pointed out in the claims.

In the drawings:—Figure 1 is a side elevation of a talking machine embodying one form of my invention, the sound-box being shown in two different positions, one in dotted lines. Fig. 2 is an enlarged detail, showing a part only of the machine and illustrating the manner of applying the handle or thumb-screw by which I am enabled to accomplish my purpose. Fig. 3 is an enlarged perspective view of the thumb-screw.

Referring to the several figures of the drawings, in which corresponding parts are indicated by like reference characters:—10

indicates a talking machine of the ordinary type, having applied to it the usual winding-key 11, and provided with the usual turn-table 12 and disk-record 13. From the rear rises an arm 14 carrying a collar 15 in which is mounted so as to turn freely therein and to be supported thereby the ordinary horn 16. Also revolubly mounted in and supported by said collar 15 is a curved tube 17 at the free end of which is secured a sleeve 18 adapted to form a bearing for a U-tube 19 one end of which is inserted in said sleeve. The other end of the U-tube 19 carries the usual sound-box 20. It is not believed that it is necessary to describe these parts further here, inasmuch as they are well-known and form no part of my invention.

In the end of the U-tube which enters the sleeve 18 is secured a thumb-screw 21. As will be readily understood, when it is desired to raise the sound-box from the record, this can be very effectually done by simply turning the thumb-screw 21, without any danger of injuring the fingers or the instrument no matter how hurriedly such operation may be done. In Fig. 1 I have shown in dotted lines the relative position of the parts thus moved when they are resting on the record and also when raised from the record to apply a different record or to insert a new needle in the sound-box.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a talking machine, the combination with a turn-table adapted to carry a record, a tube adapted to be swung on an axis perpendicular to the turn-table, a sleeve on the end of said tube, a U-tube one end of which is revolubly mounted in said sleeve, and a sound-box mounted on the free end of said U-tube and adapted to rest on said record, of a handle secured to said U-tube and adapted to hold the same against withdrawal from said sleeve and by which said sound-box and U-tube may be lifted off from said record.

2. In a talking machine, the combination with a turn-table adapted to carry a record, a tube adapted to be swung on an axis per-

pendicular to the turn-table, a sleeve on the end of said tube, a U-tube one end of which is revolubly mounted in said sleeve, and a sound-box mounted on the free end of said
5 U-tube and adapted to rest on said record, of a thumb-screw secured so as to rotate therewith in the end of the U-tube which is mounted in said sleeve, whereby the U-tube

is held against withdrawal and by which said sound-box and U-tube may be lifted off 10 from the record.

HORACE H. TAYLOR.

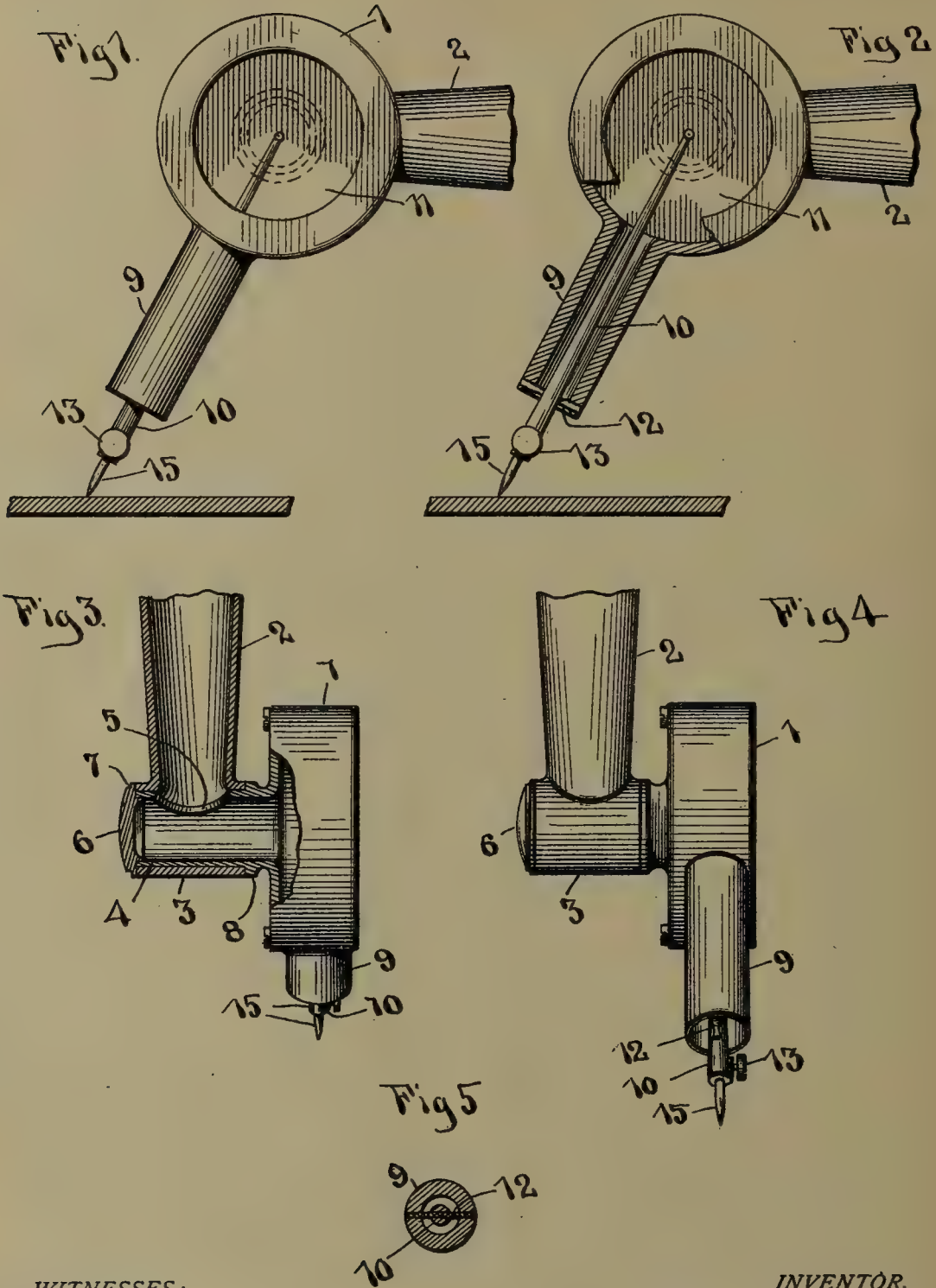
Witnesses:

JOSEPH PEARSE,
WESLEY DIXON.

D. J. HOOD.
TALKING MACHINE.
APPLICATION FILED OCT. 8, 1904.

907,362.

Patented Dec. 22, 1908.



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BY *H. Me. Pitts.*
ATTORNEY.

UNITED STATES PATENT OFFICE.

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TALKING-MACHINE.

No. 907,362.

Specification of Letters Patent.

Patented Dec. 22, 1908.

Application filed October 8, 1904. Serial No. 227,624.

To all whom it may concern:

Be it known that I, DELAWARE J. HOOD, a citizen of the United States, and a resident of the city of Philadelphia, Pennsylvania, have
5 invented certain new and useful Improvements in Talking-Machines, of which the following is a full, clear, and complete disclosure, reference being had to the accompanying drawings, forming a part of this
10 specification.

The main objects of my invention are to provide an improved mounting for a stylus bar; to provide improved means for connecting a sound box to its mounting; and to
15 provide other improvements, which will appear in the following specification.

In the accompanying drawings: Figure 1 is a fragmentary side elevation of a sound box and sound conveying arm constructed in
20 accordance with this invention, showing the same in its operative relation to a record tablet; Fig. 2 a similar view partially in section; Fig. 3 a fragmentary top plan view of the same partially in section; Fig. 4 a top plan
25 view of the same but showing the sound box rotated into position for changing needles; Fig. 5 a transverse section of the stylus bar mounting taken in the plane of the axis of oscillation of the bar.

Referring to the drawings, the device comprises a sound box 1, of the type used in connection with sound records having lateral undulations and a hollow sound conveying
30 swinging arm or tube 2 which is pivoted at its larger or inner end 2' in a well known manner to swing in a plane parallel to the disk record 3, of the laterally undulating groove type, which is mounted to rotate
35 upon the usual cabinet 3'.

For rotatably connecting the sound box with the swinging arm 2, the end of the arm 2 is provided with a short transverse sleeve or tube 4 communicating therewith, which is adapted to telescope over the outer end of a
45 tube or bushing 4' which forms a reduced extension of the rear side of the sound box casing. The tube 4' is provided with an opening in one side thereof which registers with the opening into the end of the arm 2 when
50 the sound box is in its operative position.

A cap 6 is fitted into the outer end of the tube 4' and projects radially beyond the sides of the tube forming a flange 7 contacting against the outer ends of both tubes 4 and

4', and a flange 8, upon the inner tube 4' contacts against the inner end of the tube 4, and the inner tube 4' is thus held rotatably in position in the outer tube 4. By this means the sound box is mounted to swing in a plane parallel to the face of the record 3 and to rotate on an axis coincident with the longitudinal axis of the tube 4', substantially parallel to the face of the record 3 and substantially perpendicular to the longitudinal axis of the swinging arm 2.

The mounting for the stylus bar comprises a tube 9 projecting radially and rigidly from the sound box casing and communicating therewith, and the stylus bar 10 extends within and axially of the tube 9. The stylus bar is elongated to correspond to the length of the containing tube 9. The inner end of the stylus bar is phonetically connected to the diaphragm 11 as usual and the outer end of the bar is mounted to oscillate upon a torsional spring 12 which extends diametrically of the outer end of the tube 9, the spring being fixed rigidly both to the bar and to the tube. The stylus bar has the usual socket and set screw 13 for holding the stylus needle
55 60 65 70 75 80 15 in position.

As in the present embodiment of this invention, the sound box is restrained to swing in a plane parallel to the face of the record, it is necessary to have some means for holding the stylus needle yieldingly in contact with the record groove with sufficient pressure to produce the best results. For this purpose the walls of the tube 9 are made of sufficient weight to give by gravity the desired turning movement to the sound box when the sound box is in operative position as shown in Figs. 1 and 2.

It is apparent that the radial tube 9 on the sound box serves not only as a weight to hold the stylus needle in contact with the record, but also serves as a protector for the stylus bar, and also enables an elongated bar to be used having its axis of oscillation spaced at a greater distance than usual from the inner end of the bar, thus increasing the amplitude of vibration of the diaphragm in reproducing.

When it is desired to change needles the sound box is rotated into the position shown in Fig. 4, and, obviously, stops 16 may be employed for limiting this movement of the sound box so that the stylus bar may be retained in a raised inverted position to facilitate

tate the operation of changing needles and also to keep the stylus needle away from the record when the machine is not in use.

It is evident that in the connection provided by this invention between the sound box and the swinging sound conveying arm there would be but little friction between the moving parts, that the passages are short and conveniently shaped, and that it would not be necessary to lift any of the weight of the body of the sound box in changing needles or in removing the needle from the record.

Although I have described only one form in which this invention may be embodied, it is obvious that many changes might be made in the construction herein set forth, within the scope of the appended claims, to adapt the invention to different requirements and different types of talking machines, without departing from the spirit of this invention or sacrificing any of the advantages thereof.

Having thus described the nature of my invention, I do not wish to be understood as being limited to the exact arrangement of parts and form herein shown, for the same may be varied to suit different requirements and different types of talking machines, but what I claim and desire to protect by Letters Patent of the United States, is,—

1. In a sound box for talking machines, a pivoted sound box casing, a tube connected to said casing, and a stylus bar passing through said tube, and having its fulcrum adjacent the outer end thereof.

2. In a sound box for talking machines, an axially pivoted sound box casing, a tube projecting radially therefrom, and communicating with the interior of the sound box, a stylus bar passing through said tube, and having its fulcrum adjacent the outer end thereof.

3. In a sound box for talking machines, an axially pivoted sound box casing, a weighted tube attached thereto, and communicating with the interior thereof, and a stylus bar passing through said tube, and having its fulcrum adjacent the outer end thereof.

4. In a sound recording and reproducing machine, the combination with a sound box mounted to oscillate in a vertical plane, of a rigid tube having thickened walls extending radially therefrom, and a stylus bar passing through said tube.

5. In a sound recording and reproducing machine, the combination with a sound box mounted to oscillate in the plane of its diaphragm, of a weighted tube extending radially therefrom and a stylus bar passing through said tube.

6. In a sound recording and reproducing machine, the combination with a sound box mounted to oscillate in the plane of its diaphragm, of a tube having thickened walls and a stylus bar having its fulcrum at the extremity of said tube.

7. In a talking machine, a sound box hav-

ing a tube projecting from one side thereof, and a stylus bar fulcrumed on said tube.

8. In a talking machine, a freely rotatable sound box having a tube projecting from one side thereof, and a stylus bar fulcrumed on said tube.

9. In a sound recorder or reproducer, the combination with a sound box mounted to rotate upon its longitudinal axis, of a stylus bar, and means carried by said sound box, and upon which said stylus bar is mounted, to turn said sound box on its axis.

10. In a sound recorder or reproducer, the combination with a sound box mounted to rotate upon its longitudinal axis, of a stylus bar, and a weighted projection carried by said sound box, and upon which said stylus bar is mounted, to turn said sound box on its axis.

11. In a sound recorder or reproducer, the combination with a freely rotatable sound box, of a tube projecting from one side thereof and a stylus bar passing through said tube.

12. In a sound recorder or reproducer, the combination with a sound box, of a tube connected thereto and extending radially therefrom, and a stylus bar passing through said tube and mounted thereon adjacent the outer end thereof.

13. In a sound recorder or reproducer, the combination with a freely rotatable sound box, of a stylus bar, and means carried by said box and upon which said bar is mounted to turn said box upon its axis.

14. In a sound recorder or reproducer, the combination with a sound box freely rotatable upon its longitudinal axis, of a stylus bar, and means carried by said box and upon which said bar is mounted to turn said box upon its axis.

15. In a sound recorder or reproducer, the combination with a freely rotatable sound box, of a tube projecting from one side thereof, and a stylus bar passing through said tube and fulcrumed thereto adjacent the outer end thereof.

16. In a sound recorder or reproducer, the combination with a sound box freely rotatable upon its longitudinal axis, of a rigid tube projecting from one side thereof, and a stylus bar passing through said tube.

17. In a sound recorder or reproducer, the combination with a sound box freely rotatable upon its longitudinal axis, of a tube projecting from one side thereof, and a stylus bar passing through said tube and fulcrumed thereto adjacent the outer end thereof.

18. The combination with a sound box, of a tube projecting from one side thereof, and a stylus bar in said tube and spaced therefrom.

19. The combination with a sound box, of a tube projecting from one side thereof, and a stylus bar in said tube and having its axis of oscillation adjacent the outer end thereof.

20. In a sound conveyer or reproducer, a sound box rotatable upon its longitudinal axis having an axial tubular extension closed at its outer end communicating therewith, and provided with an aperture in the side of said extension for lateral communication.

21. In a sound recorder or reproducer, the combination with a sound box rotatable upon its longitudinal axis having an axially tubular extension closed at its outer end and provided with an aperture in the side thereof, of means surrounding said extension and communicating therewith for holding said sound box in position.

22. The combination with a sound box, of a rigid tube projecting from one side thereof, and a stylus bar in said tube.

23. The combination with a sound box, of a rigid tube projecting from one side thereof, and a stylus bar in said tube and mounted to oscillate upon an axis adjacent the outer end of the tube.

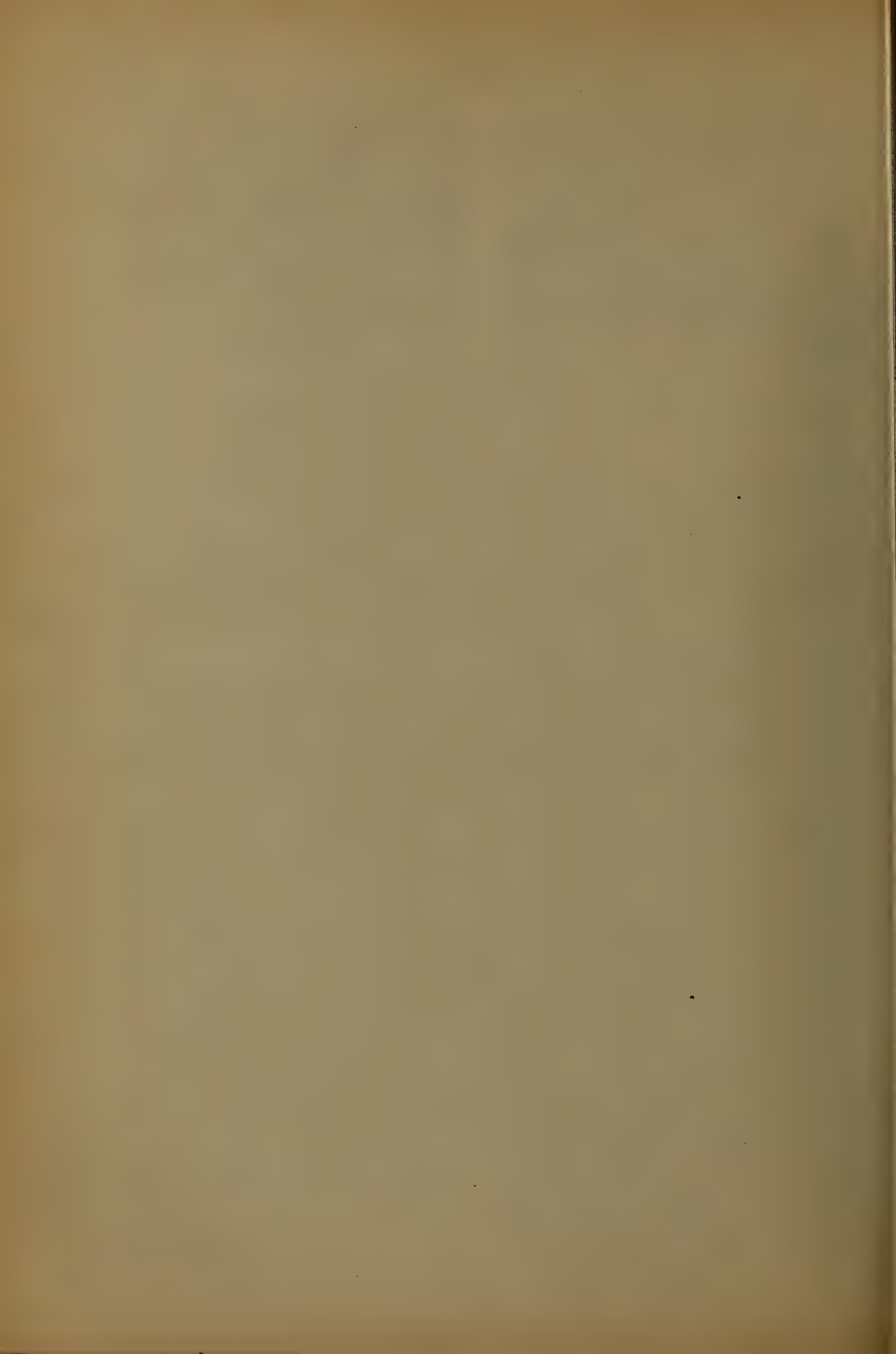
In witness whereof I have hereunto set my hand this 7th day of October, 1904.

DELAWARE J. HOOD.

Witnesses:

JOHN F. GRADY,

EDW. W. VAILL, Jr.



907,363.

Patented Dec. 22, 1908.

2 SHEETS—SHEET 1.

Fig. 1.

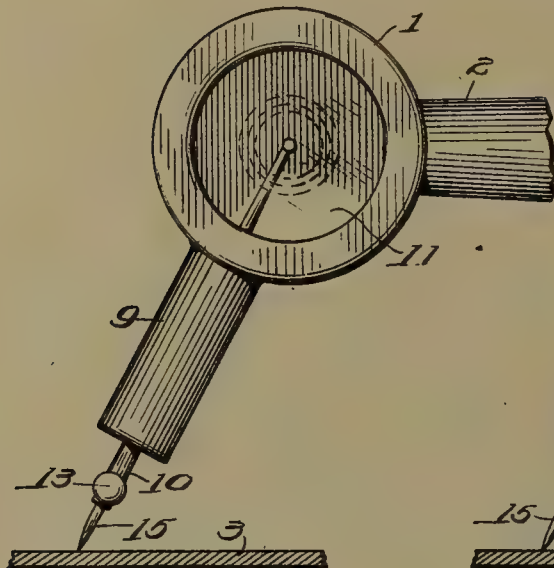


Fig. 2.

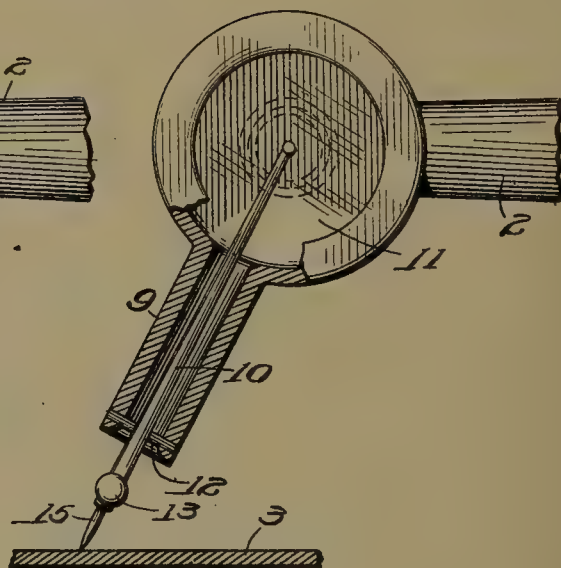


Fig. 3.

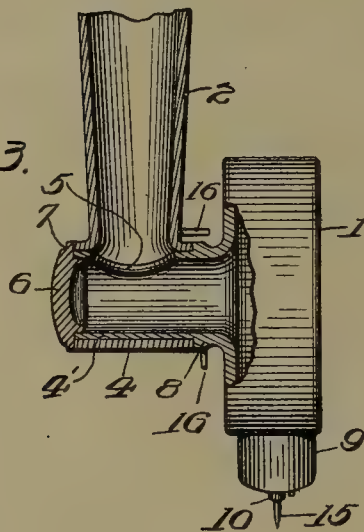


Fig. 4.

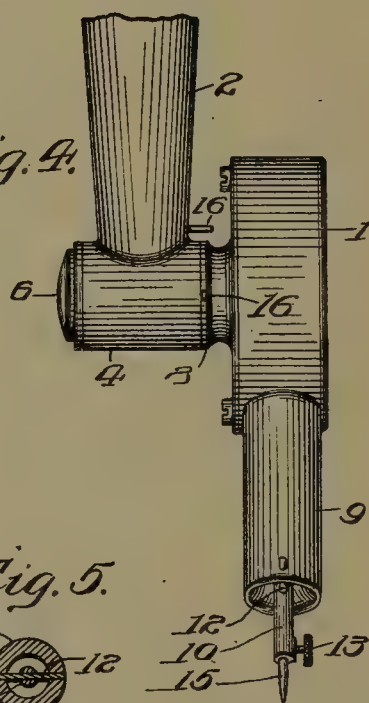
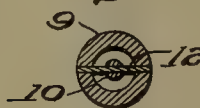


Fig. 5.



INVENTOR

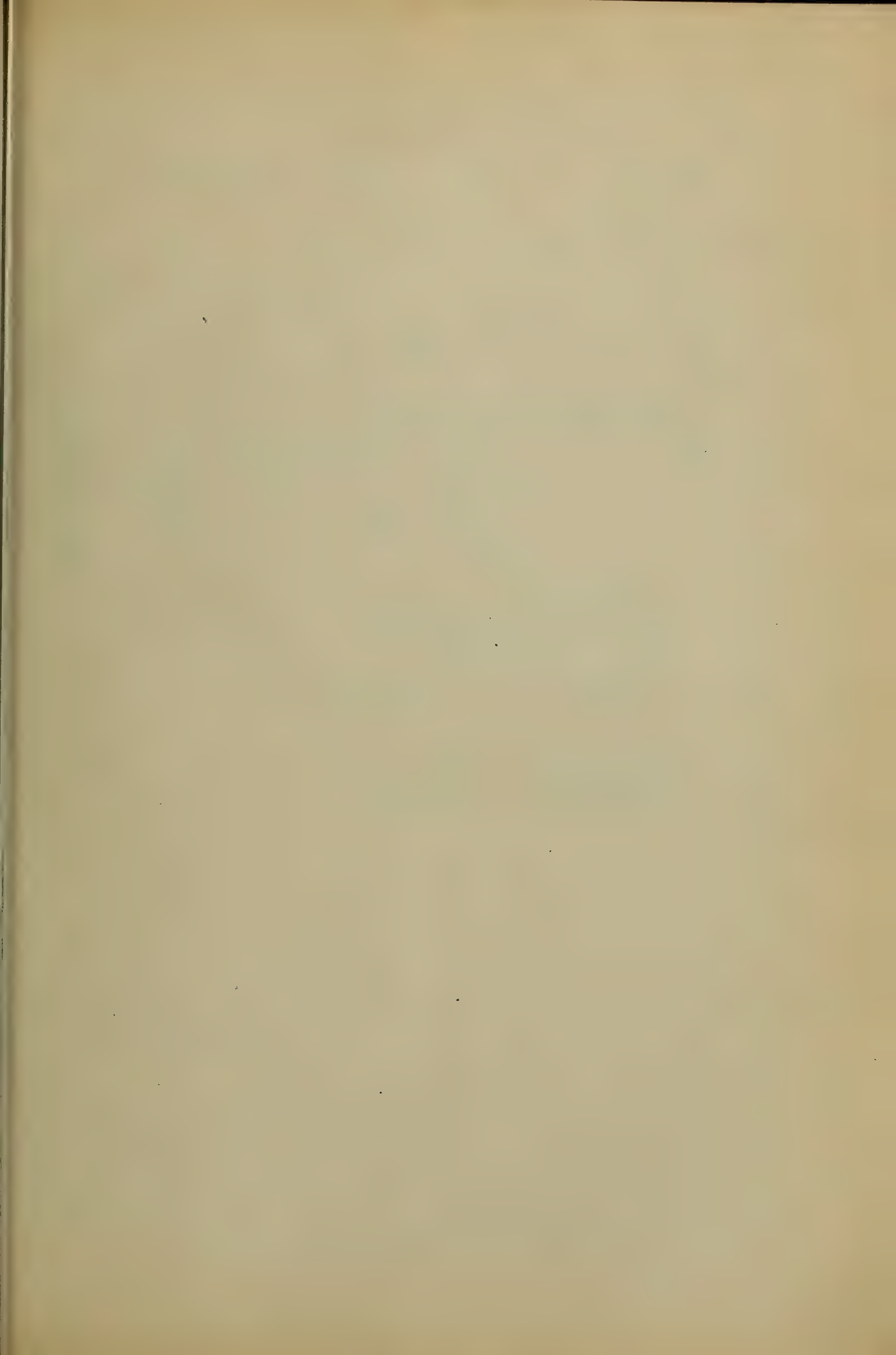
Delaware J. Hood.

BY

1 time *[Signature]*

ATTORNEY

WITNESSES
H. J. Hartman.
A. J. Gardner



D. J. HOOD.
TALKING MACHINE.
APPLICATION FILED APR. 24, 1908.

907,363.

Patented Dec. 22, 1908.

2 SHEETS—SHEET 2.



Fig. 6.

WITNESSES

F. J. Hartman.

A. J. Gardner.

BY

Home. Pet.

ATTORNEY

UNITED STATES PATENT OFFICE.

DELAWARE J. HOOD, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

No. 907,363.

Specification of Letters Patent.

Patented Dec. 22, 1908.

Original application filed October 8, 1904, Serial No. 227,624. Divided and this application filed April 24, 1908.
Serial No. 428,907.

To all whom it may concern:

Be it known that I, DELAWARE J. HOOD, a citizen of the United States, and a resident of the city of Philadelphia, Pennsylvania, have
5 invented certain new and useful Improvements in Talking-Machines, of which the following is a full, clear, and complete disclosure, reference being had to the accompanying drawings, forming a part of this
10 specification, this application being a division of my application filed October 8, 1904, Serial No. 227,624.

The main objects of my invention are to provide improved means, of simple, durable
15 construction, for connecting a sound box to a hollow sound conveying arm, and which will be easy to operate and effective in action; to provide improved means for holding the stylus needle in contact with the record; and to
20 provide other improvements which will appear in the following specification.

In the accompanying drawings: Figure 1 is a fragmentary side elevation of a sound box and sound conveying arm constructed in
25 accordance with this invention, showing the same in its operative relation to a record tablet; Fig. 2 a similar view partially in section; Fig. 3 a fragmentary top plan view of the same partially in section; Fig. 4 a top plan
30 view of the same but showing the sound box rotated into position for changing needles; Fig. 5 a transverse section of the stylus bar mounting taken in the plane of the axis of oscillation of the bar; and Fig. 6 is a side ele-
35 vation of a talking machine constructed in accordance with this invention.

Referring to the drawings, the device comprises a sound box 1, of the type used in connection with sound records having lateral un-
40 dulations and a hollow sound conveying swinging arm or tube 2 which is pivoted at its larger or inner end 2' in a well known manner to swing in a plane parallel to the disk record 3, of the laterally undulating
45 groove type, which is mounted to rotate upon the usual cabinet 3'.

For rotatably connecting the sound box with the swinging arm 2, the end of the arm 2 is provided with a short transverse sleeve or
50 tube 4 communicating therewith, which is adapted to telescope over the outer end of a tube or bushing 4' which forms a reduced extension of the rear side of the sound box casing. The tube 4' is provided with an open-

ing in one side thereof which registers with 55 the opening into the end of the arm 2 when the sound box is in its operative position.

A cap 6 is fitted into the outer end of the tube 4' and projects radially beyond the sides of the tube forming a flange 7 contacting 60 against the outer ends of both tubes 4 and 4', and a flange 8, upon the inner tube 4' contacts against the inner end of the tube 4, and the inner tube 4' is thus held rotatably in position in the outer tube 4. By this means the 65 sound box is mounted to swing in a plane parallel to the face of the record 3 and to rotate on an axis coincident with the longitudinal axis of the tube 4', substantially parallel to the face of the record 3 and substantially 70 perpendicular to the longitudinal axis of the swinging arm 2.

The mounting for the stylus bar comprises a tube 9 projecting radially and rigidly from the sound box casing and communicating 75 therewith, and the stylus bar 10 extends within and axially of the tube 9 and is spaced from the inner surface of the tube. The stylus bar is elongated to correspond to the length of the containing tube 9. The inner 80 end of the stylus bar is phonetically connected to the diaphragm 11 as usual and the outer end of the bar is mounted to oscillate upon a torsional spring 12 which extends diametrically of the outer end of the tube 9, 85 the spring being fixed rigidly both to the bar and to the tube. The stylus bar has the usual socket and set screw 13 for holding the stylus needle 15 in position.

As in the present embodiment of this in- 90 vention the sound box is restrained to swing in a plane parallel to the face of the record, it is necessary to have some means for holding the stylus needle yieldingly in contact with the record groove with sufficient pressure to 95 produce the best results. For this purpose the walls of the tube 9 are made sufficient weight to give by gravity the desired turning movement to the sound box when the sound box is in operative position as shown in Figs. 100 1 and 2.

It is apparent that the radial tube 9 on the sound box serves not only as a weight to hold the stylus needle in contact with the record, but also serves as a protector for the stylus 105 bar, and also enables an elongated bar to be used having its axis of oscillation spaced at a greater distance than usual from the inner

end of the bar, thus increasing the amplitude of vibration of the diaphragm in reproducing.

When it is desired to change needles the sound box is rotated into the position shown in Fig. 4, and, obviously, stops 16 may be employed for limiting this movement of the sound box so that the stylus bar may be retained in a raised inverted position to facilitate the operation of changing needles and also to keep the stylus needle away from the record when the machine is not in use.

It is evident that in the connection provided by this invention between the sound box and the swinging sound conveying arm there would be but little friction between the moving parts, that the passages are short and conveniently shaped, and that it would not be necessary to lift any of the weight of the body of the sound box in changing needles or in removing the needle from the record.

Although I have described only one form in which this invention may be embodied, it is obvious that many changes might be made in the construction herein set forth, within the scope of the appended claims, to adapt the invention to different requirements and different types of talking machines, without departing from the spirit of this invention or sacrificing any of the advantages thereof.

Having thus fully described my invention, what I claim and desire to protect by Letters Patent of the United States is:

1. In a sound recording and reproducing machine, the combination with a sound conveying arm, of a sound box connected thereto, the said sound box being journaled to oscillate about an axis extending longitudinally and centrally of said sound box, a stylus bar, and means carried by said sound box and upon which said stylus bar is mounted to turn said sound box on its axis.

2. In a sound recording and reproducing machine, the combination with a sound conveying arm, of a sound box, having a diaphragm therein, mounted upon said arm, said sound box being journaled in said arm to oscillate about an axis substantially coincident with the axis of said diaphragm, a stylus bar, and means carried by said sound box and upon which said stylus bar is mounted, to turn said sound box on its axis.

3. In a sound recording and reproducing machine the combination with a sound conveying arm terminating in a sleeve, of a sound box journaled to oscillate in said sleeve about an axis extending longitudinally and centrally through said sound box, a stylus bar, and means carried by said sound box and upon which said stylus bar is mounted to turn said sound box upon its axis to hold the free end of said stylus bar yieldingly in position.

4. In a talking machine, the combination with an axially pivoted sound box casing, of a hollow sound conducting arm, means for

connecting said sound box casing directly to the end of said hollow arm, a weighted projection carried by said sound box casing and a stylus bar carried by said weighted projection said weighted projection forming the means for holding the free end of said stylus bar yieldingly in position.

5. In a talking machine, the combination with an axially pivoted sound box casing, of a hollow sound conducting arm, a joint for connecting said sound box with said hollow arm so that the axis of said sound box is transverse to the axis of said arm, a weighted projection carried by said sound box casing, and a stylus bar carried by said weighted projection, said weighted projection forming the means for holding the free end of said stylus bar yieldingly in position.

6. In a talking machine, the combination with an axially pivoted sound box casing, of a hollow sound conveying arm terminating in a transverse sleeve, a bushing carried by said sound box casing and adapted to telescope with said sleeve, there being communication between the interior of said arm and said bushing, means for retaining said bushing in position within said sleeve, a weighted projection carried by said sound box casing, and a stylus bar fulcrumed on said projection, said weighted projection forming the means for holding the free end of said stylus bar yieldingly in position.

7. In a talking machine, the combination with an axially pivoted sound box casing, of a hollow sound conveying arm terminating in a transverse sleeve, a bushing carried by said sound box casing and adapted to telescope with said sleeve, there being communication between the interior of said arm and said bushing, means for retaining said bushing in position within said sleeve, a weighted tube carried by said sound box casing, and a stylus bar fulcrumed on said tube, said weighted tube forming the means for holding the free end of said stylus bar yieldingly in position.

8. In a sound recording and reproducing machine, the combination with a hollow sound conducting arm, of a sound box having a tube projecting from the rear side thereof, the said sound tube being journaled transversely to the longitudinal axis of and in lateral communication with said arm and being freely rotatable about the longitudinal axis of said tube, a stylus bar, and means carried by said sound box and upon which said stylus bar is mounted, to turn said sound box on its axis to bring the free end of said stylus bar adjacent the record.

9. In a sound recorder or reproducer, the combination with a sound arm, of a sound box carried thereby and rotatable upon its longitudinal axis with respect thereto, a stylus bar, and means carried by said sound box, and upon which said stylus bar is

mounted, to swing said sound box upon its axis.

10. In a sound recorder or reproducer, the combination with a sound conveying arm, of
5 a sound box rotatable upon its longitudinal axis thereon, a weighted projection carried by said sound box, and a stylus bar mounted upon said projection.

11. In a talking machine, the combination
10 with a sound conducting arm terminating in a transverse sleeve of a sound box casing pivoted to rotate about its longitudinal axis in said sleeve and communicating with said sound arm, and means to prevent movement
15 of said casing longitudinal of its axis.

12. In a talking machine, the combination with a sound conducting arm terminating in a transverse sleeve, of a sound box having an axial tubular extension rotatably fitting in
20 said sleeve, and communicating with said arm, and means to prevent movement of said casing longitudinal of its axis.

13. In a talking machine, the combination with a hollow sound conducting arm terminating in a transverse tubular portion open at each end, of a sound box having an axial tubular extension rotatably fitting in
25 said transverse tubular portion of the arm, and communicating with said arm, and a cap closing the inner end of said tubular extension.

14. In a talking machine, the combination with a sound conveying arm, a sound box, a stylus and a diaphragm, said sound box being pivoted to swing on said arm on an axis
35 substantially normal to said diaphragm, of means extending outwardly from said sound box to cause said stylus to engage the record with the required pressure and a stylus bar
40 mounted upon said means.

15. In a talking machine, the combination with a sound box, of a support therefor, whereby said box is restrained to swing in a fixed plane, said box being free to oscillate
45 about its longitudinal axis, and means carried by the box to hold it yieldingly in position.

16. In a talking machine, the combination with a sound box, of a support therefor
50 mounted to oscillate in a fixed plane, said sound box being freely rotatable upon its longitudinal axis, and a weighted projection carried by said sound box for holding the same yieldingly in position.

17. In a talking machine, the combination with a support mounted to swing in a fixed plane, of a sound box connected thereto, said sound box being mounted to oscillate about its longitudinal axis, a stylus bar, and
60 a tube projecting from said box and in which said stylus bar is mounted to oscillate to turn said box on its axis.

18. In a talking machine, the combination with a support, of a sound box connected
65 thereto, the said sound box being mounted to

oscillate about its longitudinal axis, a stylus bar, and means carried by said sound box and upon which said stylus bar is mounted to turn said box on its axis.

19. In a talking machine, the combination
70 with a support, of an axially pivoted sound box casing carried thereby, a weighted projection carried by said casing, and a stylus bar mounted upon said weighted projection, said projection forming the means for holding
75 the free end of said stylus bar yieldingly in position.

20. In a talking machine, the combination with a sound box, of a radial arm support therefor, said sound box being free to oscillate and to be inverted about its longitudinal axis, means carried by the box to hold it
80 yieldingly in operative position, and a stop carried by said arm to hold the box in inoperative position.

21. In a talking machine, the combination with a sound box, of a radial arm support therefor, said box being free to oscillate and to be inverted about its longitudinal axis, a weight rigid with said box for holding the
85 same yieldingly in operative position, and a stop carried by said arm to hold the box in inoperative position.

22. In a talking machine, the combination with a sound box, of a support therefor, said
90 sound box being freely rotatable with respect thereto, a stylus bar, and means carried by said box and upon which said stylus bar is mounted to hold said box yieldingly in position.

23. In a talking machine, the combination with an arm mounted to swing in a fixed plane, of a sound box carried by said arm and rotatable with respect thereto, a stylus bar, and means carried by said box and upon
105 which said stylus bar is mounted to turn said box on its axis.

24. In a talking machine, the combination with a sound box, of a support therefor mounted to swing in a fixed plane, said box
110 being free to oscillate about its longitudinal axis, a stylus bar carried by said box, a record support, and means carried by the box to hold the free end of said bar yieldingly in position adjacent said record support.

25. In a talking machine, the combination with a hollow support, of a sound box carried thereby, a tube projecting from said sound box, and a stylus bar in said tube.

26. In a talking machine, the combination
120 with a sound box, of a support therefor whereby said box is restrained to swing in a fixed plane, said box being free to oscillate about its longitudinal axis, a stylus bar carried by said box, a record support, and means
125 carried by the box to hold the free end of said bar yieldingly in position adjacent said record support.

27. In a talking machine, the combination with a hollow support, of a sound box carried
130

thereby and communicating therewith, said sound box being freely rotatable upon its longitudinal axis but being held against movement longitudinally of said axis with respect to said support.

28. In a talking machine, the combination with a hollow support, of a sound box carried thereby and communicating therewith, said sound box being freely rotatable upon its longitudinal axis but being held against movement longitudinally of said axis with respect to said support, and the longitudinal axis of said sound box being transverse to the longitudinal axis of said support.

29. In a talking machine, the combination with a movable hollow support, of a sound

box carried thereby and movable with respect thereto, a tube projecting from said sound box, and a stylus bar in said tube.

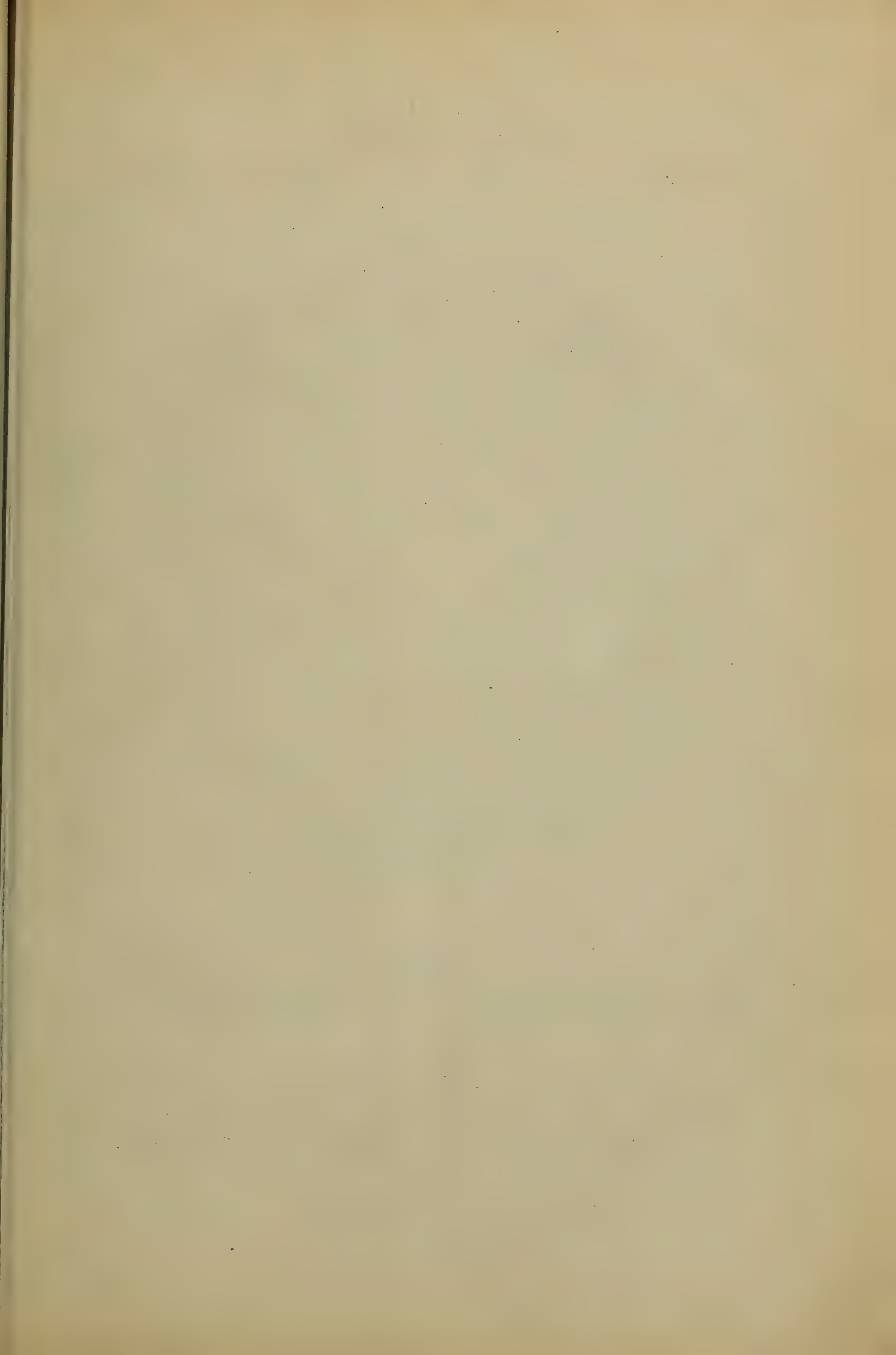
30. In a talking machine, the combination with a hollow sound conducting arm terminating in a transverse tubular portion, of a sound box carried by said tubular portion and communicating with said arm, said sound box being freely rotatable upon its longitudinal axis.

In witness whereof, I hereunto set my hand this 23rd day of April 1908.

DELAWARE J. HOOD.

Witnesses:

ALSTON B. MOULTON,
ALEXANDER PARK.



J. A. LIEB.
 RECORD DISK FOR TELEGRAPHERS.
 APPLICATION FILED MAR. 25, 1907.

907,383.

Patented Dec. 22, 1908.

Fig. 1.

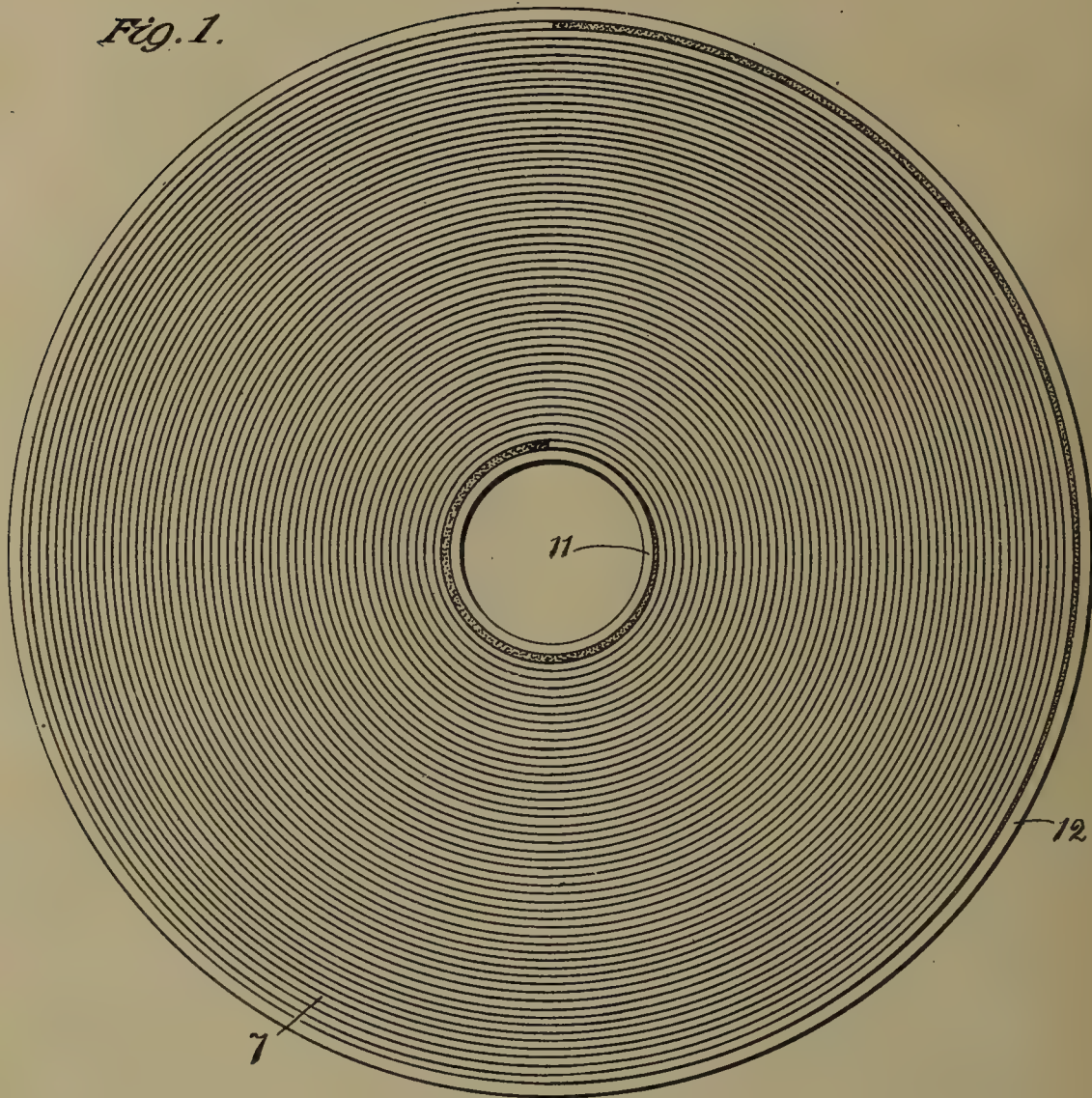


Fig. 2.

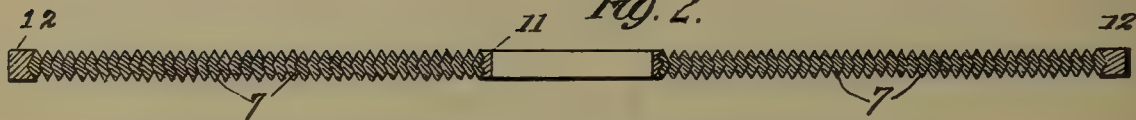


Fig. 3.



Witnesses:
Frank S. Ober.
Amos A. Ober.

Inventor
John A. Lieb
 By his Attorneys
Rosenbaum & Luckbridge

UNITED STATES PATENT OFFICE.

JOHN A. LIEB, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN TELEGRAPHONE COMPANY, A CORPORATION OF THE DISTRICT OF COLUMBIA.

RECORD-DISK FOR TELEGRAPHONES.

No. 907,383.

Specification of Letters Patent.

Patented Dec. 22, 1908.

Application filed March 25, 1907. Serial No. 364,509.

To all whom it may concern:

Be it known that I, JOHN A. LIEB, a citizen of the United States, residing at the city of New York, in the borough of Brooklyn and State of New York, have invented certain new and useful Improvements in Record-Disks for Telegraphones, of which the following is a full, clear, and exact description.

My invention relates to an improvement in the recording disks which are used with the telegraphone, and in which a magnetic sound record is made by magnetizing the steel in a spiral path under the influence of an electromagnet in a telephone circuit. For this purpose plain steel disks have been used, but it is necessary with a flat or plane disk to have a separate and special guiding means for moving the electromagnet radially over the face of the disk as the latter rotates. It is evident that in case of wear, or certain imperfections in the mechanism, the path traced in the reproduction may not exactly accord to that of the recording operation. Moreover, in case the disk is removed from one machine to be used in another, or in case it is attempted to use a number of records with one machine in succession, the placing and readjustment of the disks may not be properly made. For these reasons it is desirable to have the guiding means on the face of the disk itself. In carrying out my invention I secure this result in a very simple and easy way by spirally winding a steel strip or wire so as to produce a built-up disk with a flat face. This construction has certain additional advantages from the standpoint of efficiency of reproduction, as will be later pointed out.

With these objects in view, the invention consists in the features of construction and combination hereinafter set forth and claimed.

In the drawings: Figure 1 is a front or face view of a magnetic reproduction disk embodying the principles of my invention; Fig. 2 is a sectional view of the same; Fig. 3 is a detail sectional view of the strip of wire employed therefor.

Referring to the drawings in which like parts are designated by the same reference sign, 7 denotes a special form of wire or strip which will be self supporting when wound in a spiral coil. A convenient form for this purpose is that shown in Fig. 3, in which the wire 7 is convex on one side 8, and concave on the other side 9. The side edges 10 of a

wire or strip of this form come substantially to an apex or point, although this is, of course, not essential. With this form of the invention it is merely necessary to obtain a supporting core or member 11, and wind the strip 7 spirally thereabout, until a disk of the required size is produced. This is best done between guiding plates so as to keep the alinement perfect. Finally, when the coil or disk is of the required size, a band 12 of Bab-bitt metal or other material is shrunk about its peripheral edge so as to tightly clamp all of the convolutions into a compact or unitary disk or structure.

With the form of the invention as above described a steel disk is finally produced in which the face has a continuous guiding thread or spiral edge due to the wire convolutions. It is evident that this thread or spiral may be made the guiding means of the recording and reproducing devices in exactly the same way as the spiral grooves of an ordinary graphophone disk are used. The magnetic record is made in the steel wire in accordance with the well known telegraphone principle. In practice the records obtained by a built-up disk of this form are very efficient for the purposes of reproduction, since the successive spirals or convolutions, being separated from one another by an air gap except for a slight imperfect contacting line or area, do not exert a de-magnetizing action on one another.

What I claim, is:—

1. A record-receiving body for telegraphones consisting of wire of magnetic material wound in spiral form with the adjacent convolutions interlocking with each other.

2. A record-receiving body for telegraphones consisting of a wire or strip having opposite concave and convex sides wound into a spiral in which the convex side of one convolution is seated in the concave side of another.

3. A record-receiving body for telegraphones consisting of a wire or strip with sharp edges having opposite concave and convex sides wound into a spiral in which the convex side of one convolution is seated in the concave side of another.

4. A record-receiving body for telegraphones consisting of a wire or strip with sharp edges having opposite concave and convex sides wound into a spiral in which the convex side of one convolution is seated in

the concave side of another, and an outside clamp holding the convolutions together.

5 5. A built-up disk for a telegraphone, comprising spirally coiled steel wire, the various convolutions of which interlock with one another.

6. A built-up disk for a telegraphone, comprising spirally coiled steel wire the various convolutions of which interlock with one

another, and means surrounding the coil for 10 binding the convolutions into permanent engagement with one another.

In witness whereof, I subscribe my signature, in the presence of two witnesses.

JOHN A. LIEB.

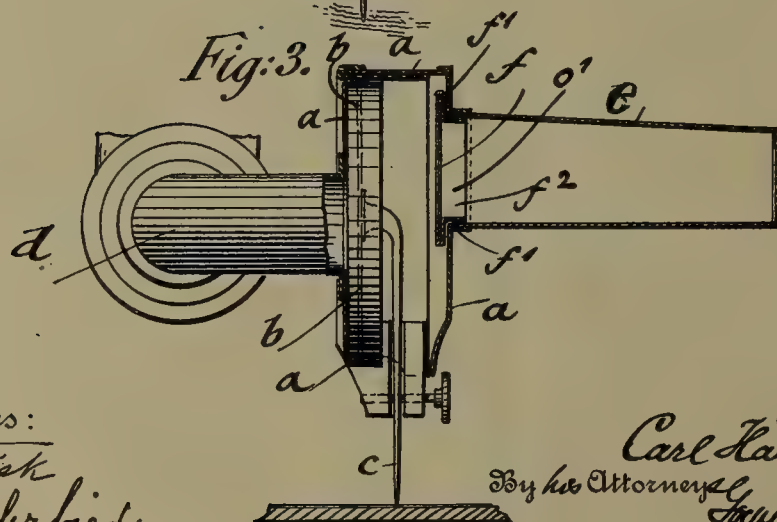
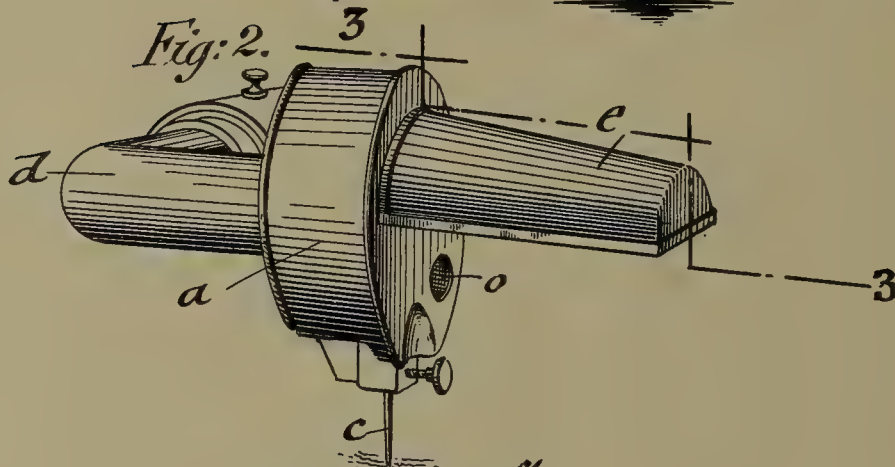
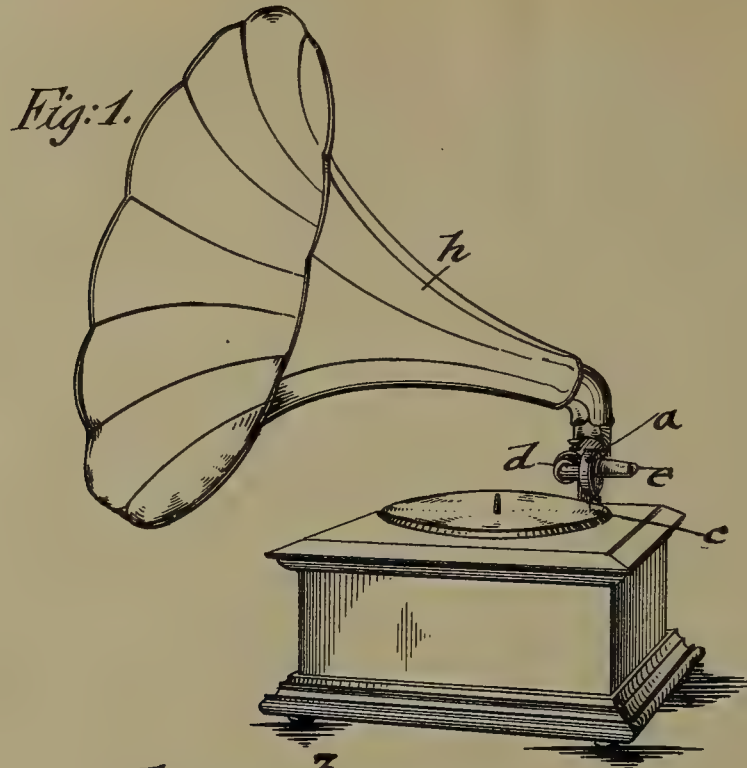
Witnesses:

WALDO M. CHAPIN,
MAY BIRD.

C. HARTMANN.
 RESONATOR FOR PHONOGRAPHIC REPRODUCERS.
 APPLICATION FILED MAR. 13, 1908.

907,794.

Patented Dec. 29, 1908.



Witnesses:
Fannie Fisk
H. J. Suhrbier

Inventor
Carl Hartmann
 By his Attorneys
J. H. & J. H. Lape

UNITED STATES PATENT OFFICE.

CARL HARTMANN, OF NEW YORK, N. Y.

RESONATOR FOR PHONOGRAPHIC REPRODUCERS.

No. 907,794.

Specification of Letters Patent.

Patented Dec. 29, 1908.

Application filed March 13, 1908. Serial No. 420,930.

To all whom it may concern:

Be it known that I, CARL HARTMANN, a citizen of the United States of America, residing at New York, in the borough of the Bronx, county and State of New York, have invented certain new and useful Improvements in Resonators for Phonographic Reproducers, of which the following is a specification.

10 This invention relates to an improvement in phonographic reproducers by which the sounds reproduced by the same are rendered clearer and more distinct than heretofore; and the invention consists in adding to
15 the ordinary reproducer-box containing the diaphragm an extension or resonator which is closed at the outer end and provided at its inner end with an auxiliary diaphragm, the frame of which is tightly fitted into the inner
20 end of the resonator, and which serves for increasing the sounds reproduced by the main or reproducing diaphragm.

In the accompanying drawings, Figure 1 represents a perspective view of a phonograph with my improved reproducer, Fig. 2 is a perspective view of the reproducer, drawn on a larger scale, and Fig. 3 is a vertical longitudinal section on line 3, 3, Fig. 2.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, *a* represents the box, *b* the diaphragm and *c* the style of a phonographic reproducer of the usual approved construction. The style is operated
35 either by a record-disk, cylinder or other record-tablet. The reproducer-box *a* is connected by a sound-conducting tube *d* with the horn *h* in the usual manner. The box *a* is provided in its rear-wall with an opening
40 *o* for establishing atmospheric pressure at the interior of the reproducer-box *a*. To the upper part of the rear-wall of the box *a* is applied a resonator-box *e* which is closed at its outer end and attached by its open inner end
45 to the rear-wall of the box *a*, the resonator surrounding an opening *o*¹ in the rear-wall of the reproducer-box. The resonator-box *e* may be made in semicircular or of other cross-section, and preferably of tapering
50 shape, being widest at its point of connection with the rear-wall of the reproducer-box *a*. The inner end of the resonator-box *e* is closed by an auxiliary diaphragm *f* of mica, which is supported in a supporting frame *f*¹

having a flange *f*², which latter is inserted 55 into the inner end of the resonator *e*, the rim of the frame overlapping the opening *o*¹ in the rear-wall of the box *a*, while the flange *f*² fits tightly into the inner end of the resonator-box *e*. The auxiliary diaphragm *f* 60 serves for the purpose of throwing the sounds produced by the reproducing diaphragm in forward direction through the sound-conducting tube to the horn and of increasing thereby the sounds to a considerable 65 extent so as to produce a clearer and louder reproduction of the same. This is caused by the fact that as the auxiliary diaphragm is located at the rear of the main-diaphragm with respect to the horn, it acts 70 (in connection with the resonator-box *e*) in the nature of a sounding-board by which the sound-waves are reflected toward the horn. The vibrations of the reproducing diaphragm are transmitted to the auxiliary diaphragm 75 and the sound is reflected therefrom in increased volume due to the action of the resonator-box. The air in the resonator-box serves as a cushion for the auxiliary diaphragm, so that the same follows the sound- 80 vibrations set up in the reproducing diaphragm.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a phonographic reproducer, the combination, with the reproducing box, diaphragm and style of the same, said box being provided with an opening in its rear-wall, of a resonator-box extending from said opening 90 and closed at its outer end, and an auxiliary diaphragm located at the inner end of said resonator-box.

2. In a phonographic reproducer, the combination, with a diaphragm and inclosing reproducer-box, of a resonator-box closed at the outer end and extending outwardly from an opening in the wall of the reproducer-box, and an auxiliary diaphragm inserted into the opening of the reproducer-box and closing 100 the inner end of the resonator-box.

3. In a phonographic reproducer, the combination, with a reproducer-box, diaphragm and reproducing style, of a resonator-box of tapering shape extending outwardly from an 105 opening in the wall of the reproducer-box, said resonator-box being closed at the outer end and open at the inner end, and an aux-

iliary diaphragm the frame of which is located in the opening of the reproducer-box and inner end of the resonator-box.

4. In a phonographic reproducer, the combination, with the reproducer-box, diaphragm and style, said box being provided with an air-opening in the lower part and a larger opening in the upper part of its wall, of a resonator-box closed at the outer and
10 open at the inner end and extending outwardly from said opening, and an auxiliary

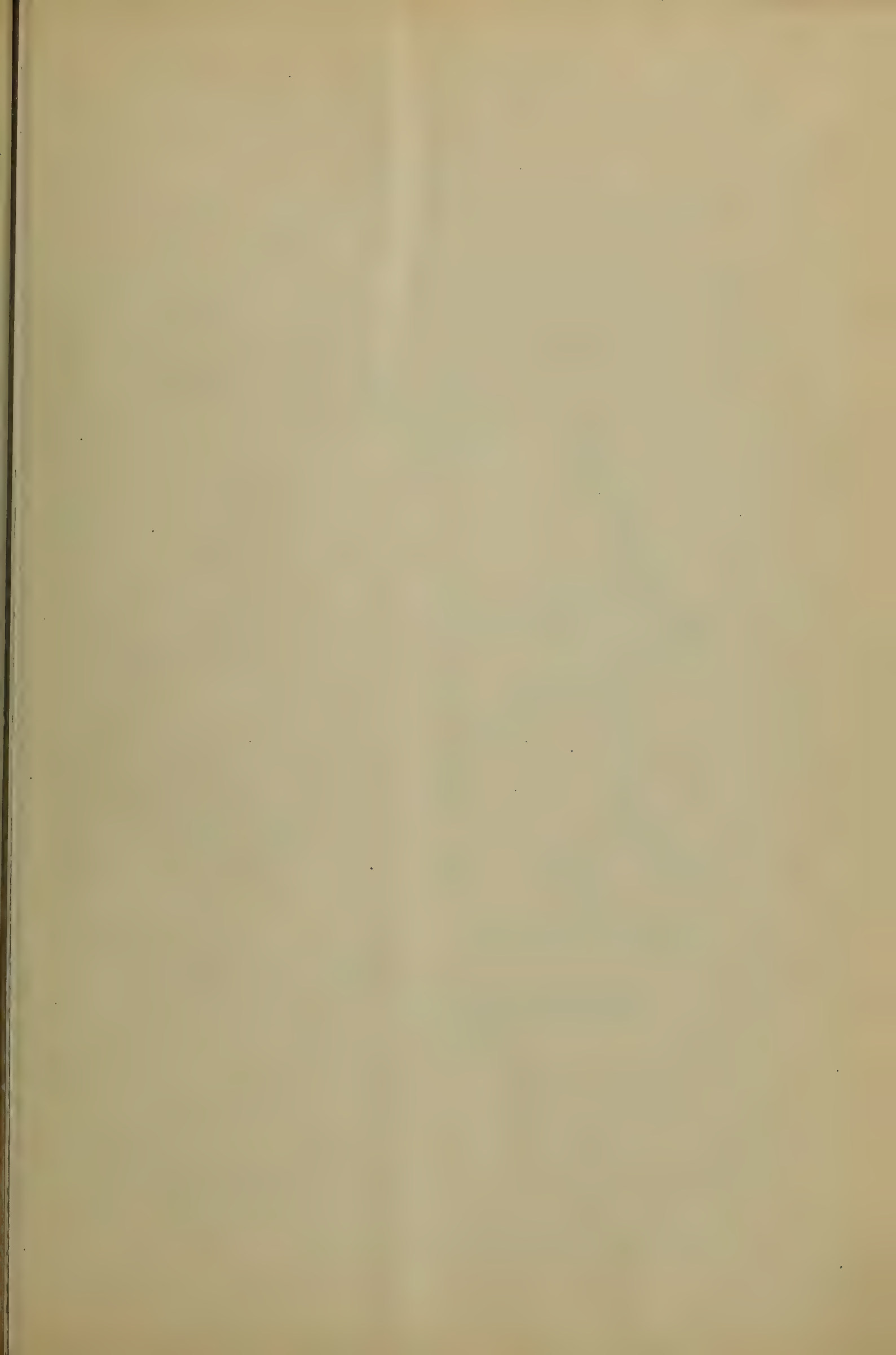
diaphragm that is tightly fitted by its frame into the larger opening of the reproducer-box and inner end of the resonator-box.

In testimony, that I claim the foregoing as
my invention, I have signed my name in
presence of two subscribing witnesses.

CARL HARTMANN.

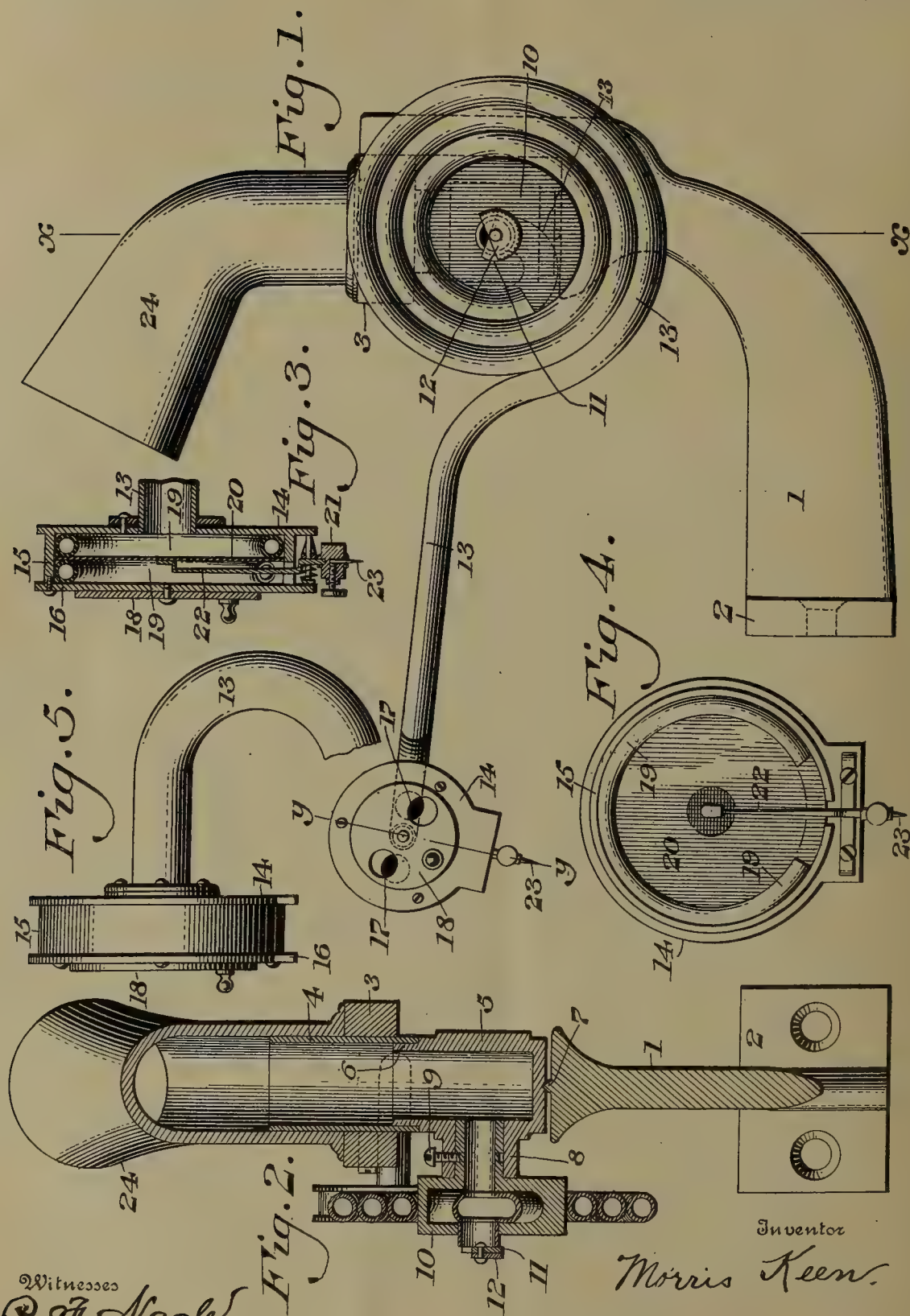
Witnesses:

PAUL GOEPEL,
ANTON KOPKA.



907,814.

Patented Dec. 29, 1908.



Witnesses
 P. F. Nagle.
 L. Rouville.

Inventor
 Morris Keen.
 By Wiedersheim & Fairbanks.
 Attorneys

UNITED STATES PATENT OFFICE.

MORRIS KEEN, OF PHILADELPHIA, PENNSYLVANIA.

PHONOGRAPH.

No. 907,814.

Specification of Letters Patent.

Patented Dec. 29, 1908.

Application filed December 21, 1905. Serial No. 292,679.

To all whom it may concern:

Be it known that I, MORRIS KEEN, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Phonographs, of which the following is a specification.

My invention relates to phonographs and consists of an artificial extension of a portion of the sound conveyer between the reproducer and the horn support, as set forth in the claims.

It further consists in means for controllably admitting air to the side of the diaphragm opposite to the admission tube, as set forth in the claims.

It further consists of novel details of construction, all as will be hereinafter fully set forth.

Figure 1 represents a side elevation of an attachment to a phonograph, embodying my invention. Fig. 2 represents a sectional view on line $x-x$, Fig. 1. Fig. 3 represents a sectional view on line $y-y$, Fig. 1. Fig. 4 represents a side elevation of the reproducing portion with one side thereof removed. Fig. 5 represents a plan view of a portion of the device on an enlarged scale.

Similar letters of reference indicate corresponding parts in the figures.

Referring to the drawings: 1 designates an arm or bracket having the plate 2 thereon which may be secured to the box of the phonograph or to a suitable support. Carried by the bracket 1 is a collar 3 to which is secured the sleeve 4.

5 designates a thimble which has a portion 6 projecting into the sleeve and which is rotatable thereon, said thimble being mounted on the pivotal point 7 carried by the bracket 1 and being provided with an extension 8. Connected with the extension 8, by means of a screw 9, is a chamber 10, the same having an opening extending transversely therewith and communicated with the interior of the thimble 5. A plate 11 partly closes the outer end of the opening and a valve 12 is connected with said plate and serves to regulate or control the outlet opening, as will be hereinafter described. Communicating with the interior of the chamber 10 is a pipe 13 which at a suitable point is formed spirally, as best understood from Figs. 1 and 2, it being noted that said spirals are situated substantially adjacent each other in order to occupy as small a space as

possible. While the convolutions of the tube have been shown in a spiral it will be apparent that any form may be used which will materially increase the length of the restricted path of travel of the sound waves from the origin of the same to their delivery, this being the object. Supported at the outer end of said pipe 13 is the phonograph reproducer or sound box 14. This reproducer is formed in any suitable manner and in the present instance consists of the body portion 15 to which the end of the pipe 13 is attached, in any suitable manner and has a plate 16 attached to the body portion, said plate having the openings 17 therein.

18 designates a valve which is pivotally mounted on the plate 16 and can move thereon.

The sound box, tube 13 and chamber 10 constitute a casing or passage way, closed to the outside air, except as provided for by my opening, throughout its entire length from the diaphragm or point of origin of the sound waves to the horn which I consider the point of delivery of the sound waves. I find an opening to the outside air between these points of origin and delivery quite desirable for some purposes and at the same time am able to close it when I wish to prevent communication with the outside air. The opening upon the delivery side of the diaphragm at 12 is to be distinguished from that upon the opposite side of said diaphragm at 17, the opening of which changes the space upon that side of the diaphragm from a closed and, under certain circumstances, a damping chamber to an open chamber permitting additional vibration of the diaphragm and giving an exit for the sound from that side of the diaphragm, this portion of the sound, however, not being shown as megaphoned. In so far as it permits more free vibration of the diaphragm this increases the volume of the sound from the delivery side of the diaphragm which is in this case, and usually, megaphoned.

Within the chamber are the two rubber tubes 19 between which is held the diaphragm 20.

The needle holder consists of the block 21 carried by the arm 22, the latter being pivotally mounted with respect to the body portion 15 and the diaphragm 20, the needle or stylus 23 being removably and adjustably held in said block 21.

24 designates the horn holder which is of

suitable shape and which is rotatably mounted upon the sleeve 4.

The operation of the device will be readily seen. The bracket 1 is firmly secured to the
5 box of the phonograph or to any suitable point that may be desired, and by reason of the construction of the horn receptacle on its support it can be turned in any direction. The stylus support which consists of the pipe
10 13 in the present instance, can also be rotated in any direction, as will be apparent, since the same rests upon the pivot 7 and is supported by the sleeve 4 which is firmly held in the collar 3. Longitudinal move-
15 ment is also permitted to the stylus in order that the same can be raised and lowered, this movement carrying with it the pipe 13 and its convolutions. When the parts are in position and the stylus is operating the
20 sound is transmitted from the vibrator 20 through the pipe 13 and its various convolutions, finally entering the interior of the thimble 5 and being discharged through the horn holder 24 which may or may not con-
25 tain a horn. By reason of this passage through this pipe 13, the sound is softened and the scratching and rasping tones which ordinarily occur in a phonograph are en-
30 tirely obviated, the result being a soft and melodious tone. In order to adjust the amount of sound I have provided valve 12 controlling the opening into the thimble 5 and by adjusting this valve, more or less air from the outside is permitted to enter and
35 be mingled with the sounds from the phonograph, the effect being that the sound from the instrument is not nearly so great and when the opening or valve is entirely closed, the sound is still softer. In addition, by
40 adjusting the valve 18, thus opening or closing the openings 17, in the plate 16, I can still further adjust the sound from the instrument, the effect of which is evident, as it often occurs, that it is not desired to have
45 the sound from the instrument too loud as it may be annoying. By reason of my construction I can regulate this as desired

Where I refer in my claims to a "coil" or to "coiled" tubes or other passages I wish to be
50 understood as including within the term "coil" or "coiled" spirals within the same or approximately the same planes, helices and any plurality of return bends or loops or even a single such loop whose purpose is the
55 lengthening of the path of travel of the sound waves or modification of the waves.

It will be evident that various changes may be made by those skilled in the art, which may come within the scope of my in-
60 vention and I do not therefore desire to be

limited in every instance to the exact construction herein shown and described.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a device of the character described, a diaphragm; a horn holder, and a spirally coiled casing therebetween. 65

2. In a device of the character described, a needle, a reproducer suitably supported, said
70 reproducer having an opening thereinto, a valve adjustably controlling said opening, a tube for transmitting the sound, a chamber in communication with said tube and having an opening therein and a valve controlling
75 said opening.

3. In a device of the character described, a stylus, a diaphragm, a transmission tube and means for controllably admitting air to the side of the diaphragm opposite to the admis-
80 sion tube in quantity as desired.

4. In a device of the character described, a diaphragm, a horn holder and a coiled casing between the diaphragm and the horn holder to increase the distance traversed by the
85 sound between these two points.

5. A talking machine comprising a repro-
ducer, a fixed horn support, and a sound con-
veyer mounted upon said support, a portion
90 of said sound conveyer extending from said reproducer toward said support, and another portion of said sound conveyer being rigid and artificially lengthened between said former portion and said support.

6. A talking machine comprising a repro- 95
ducer, a fixed horn support, and a sound conveyer mounted upon said support, a portion of said sound conveyer extending from said reproducer toward said support, and another portion of said sound conveyer being pivot-
100 ally movable and artificially lengthened between said former portion and said support.

7. In a device of the character described, a needle, a diaphragm and a tube for transmit-
105 ting the sound therefrom, said tube having a plurality of convolutions therein, through which the sound waves must pass.

8. In a device of the character described, a diaphragm, a horn holder, and a spirally coiled casing therebetween, the coils of which
110 lie in the same plane.

9. In a device of the character described, a diaphragm, a horn holder, and an artificially extended passage between the horn holder and diaphragm comprising a plurality of
115 turns of like general character.

MORRIS KEEN.

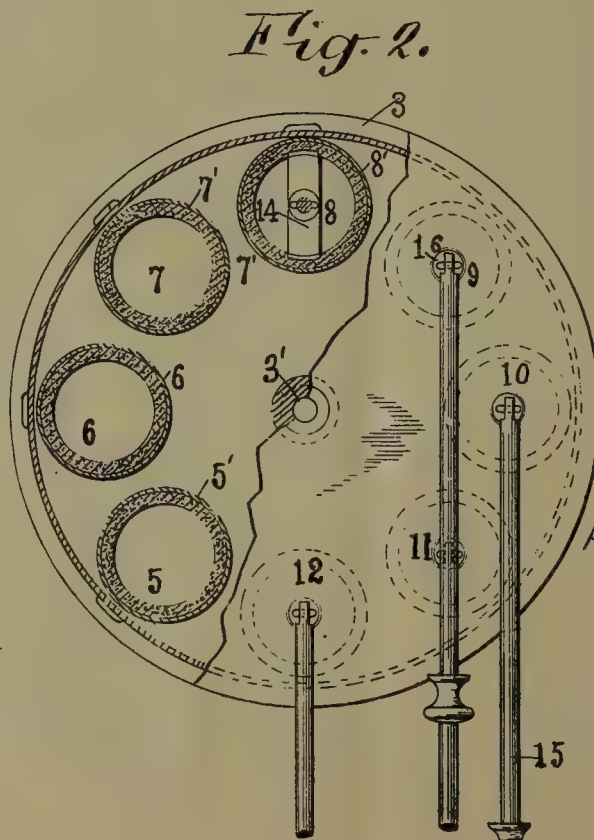
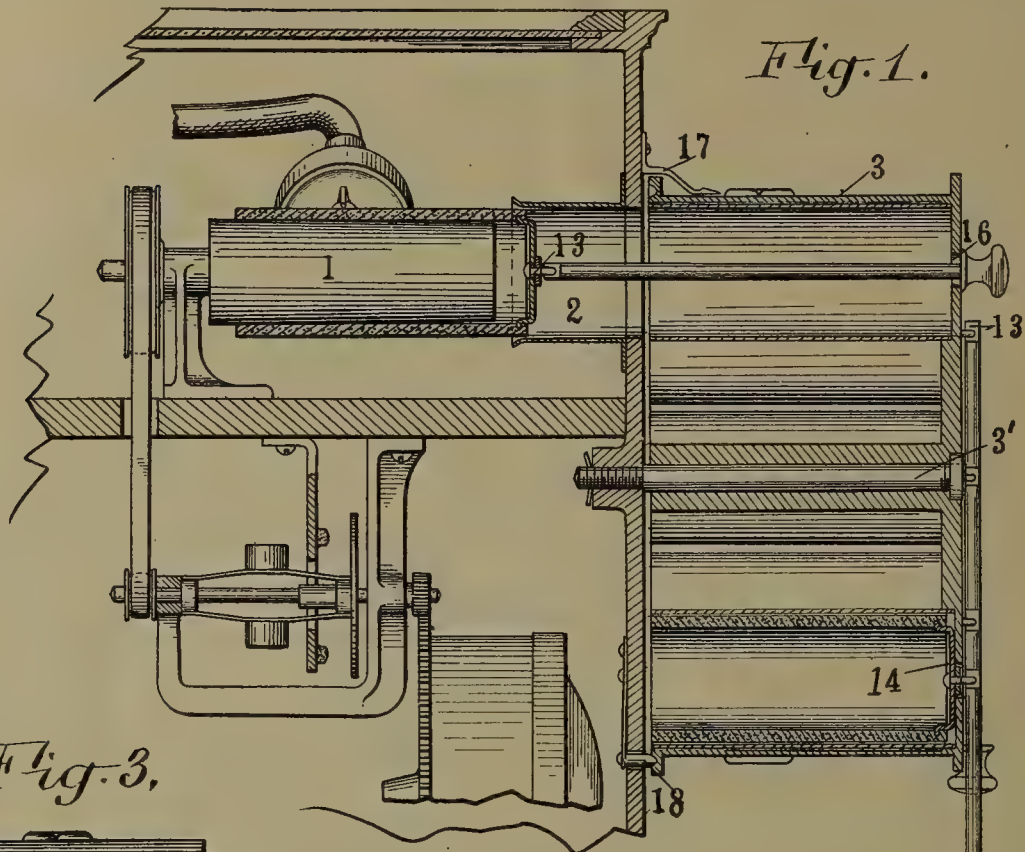
Witnesses:

WM. CANER WIEDERSHEIM,
C. D. McVAY.

H. W. LONGFELLOW, JR.
MAGAZINE GRAPHOPHONE.
APPLICATION FILED JULY 15, 1908.

907,826.

Patented Dec. 29, 1908.



WITNESSES:
Berta Feuerlicht
Am. H. Shaw

Henry W. Longfellow, Jr.,
INVENTOR

BY *Robert B. Killgore*
ATTORNEY

UNITED STATES PATENT OFFICE.

HENRY W. LONGFELLOW, JR., OF ALLSTON, MASSACHUSETTS.

MAGAZINE-GRAPHOPHONE.

No. 907,826.

Specification of Letters Patent.

Patented Dec. 29, 1908.

Application filed July 15, 1908. Serial No. 443,670.

To all whom it may concern:

Be it known that I, HENRY W. LONGFELLOW, Jr., a citizen of the United States, residing at Allston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Magazine-Graphophones, of which the following is a specification.

My invention relates to record magazines for graphophones which are adapted to be used in connection with existing machines and among my objects are the production of such magazines cheaply, substantially, and with a freedom from complications. To provide means whereby the person operating the machine may select the record desired, place the same on the mandrel, play it and transfer it to the magazine and to provide means whereby the magazine is automatically locked in position to permit the free passage of the records to the mandrel. I accomplish these objects in the manner illustrated in the accompanying drawing in which—

Figure 1 is a general view, partly in section, of the magazine attached to a graphophone; Fig. 2 a like view of the magazine; and Fig. 3 a fragmentary view showing the outer face of the magazine.

The graphophone may be of any suitable type and is provided with a single mandrel 1. Adjacent to the end of the mandrel is a guide 2 in the form of a sleeve, flared at the end as shown. This guide is located in position to aline with the mandrel and is of sufficient diameter to permit the passage of a record.

A magazine 3, preferably in the form of a drum, is revolubly mounted on a shaft 3'. This magazine has a plurality of pockets, 5, 6, 7, 8, 9, 10, 11 and 12, located equidistant from the shaft and each capable of alining with the guide 2.

Each record 5', 6', 7', etc. has a carrier 14 secured to it at the end and a push rod 15 is secured to the carrier, preferably by a universal joint thereon which extends through an aperture 16 in the end of the drum.

A series of numerals on the face of the drum serves with the aid of a pointer 17, to locate each record pocket. A ratchet stop 18 locks each pocket opposite the guide 2.

In use the magazine pockets are filled with records, each record having its own carrier and pushrod secured thereto. The drum is revolved until the desired record, as indicated by the numeral, is opposite the guide, the push rod attached to that record is then

lifted and pushed in, thereby transferring the record from the magazine pocket through the guide tube onto the machine mandrel where it is played in the usual manner. The free end of the push rod lies in the hole in the end of the drum during the reproduction. After the record is reproduced the push rod is pulled out carrying the record off the mandrel, through the flared-mouth guide and back into its magazine pocket. It is apparent that the magazine cannot be revolved during reproduction because the push rod is then connected to both machine and magazine.

I am aware that graphophones having a plurality of mandrels, each carrying a record, are old and do not claim such structures.

I claim:—

1. The combination of a graphophone having a single mandrel; a magazine adapted to contain a plurality of records; a longitudinally extended, cylindrical guideway projecting from the frame and alining with said mandrel and magazine; and means for transferring records from the magazine to the mandrel.

2. The combination of a graphophone having a single mandrel; a magazine adapted to contain a plurality of records; a longitudinally extended, cylindrical guideway projecting from the frame and alining with mandrel and magazine; means for transferring records from the magazine to the mandrel; and means for locking the magazine against motion during the transfer.

3. The combination of a graphophone having a single mandrel; a pocketed magazine revolubly mounted adjacent to the mandrel; and a guide alining with the pockets and the mandrel.

4. In a record magazine for graphophones; a plurality of pockets, each adapted to contain a record, a carrier adapted to be secured to each of the records; and a push rod attached to each carrier.

5. A record magazine for graphophones comprising a revoluble drum, pockets therein each of which is adapted to contain a record; a carrier adapted to be secured to each of said records; a push rod; and a universal joint connecting the push rod and carrier.

6. A record magazine for graphophones comprising a revoluble drum; pockets therein each of which is adapted to contain a record; a carrier adapted to be secured to

each record and extending through an aperture in the drum to a point without; and means for reciprocating said carriers.

5 7. A magazine for graphophones comprising a revoluble drum adapted to contain a plurality of records; means adapted to be directly secured to each record for manually reciprocating it; and means for

holding said drum against movement during the reciprocation.

10

In testimony whereof I have affixed my signature in presence of two witnesses.

HENRY W. LONGFELLOW, JR.

Witnesses:

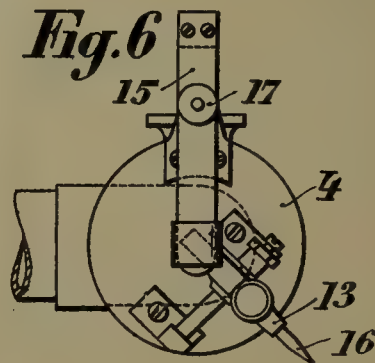
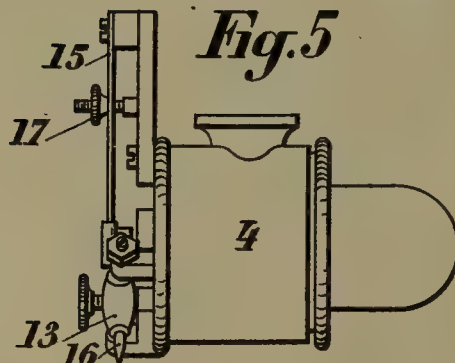
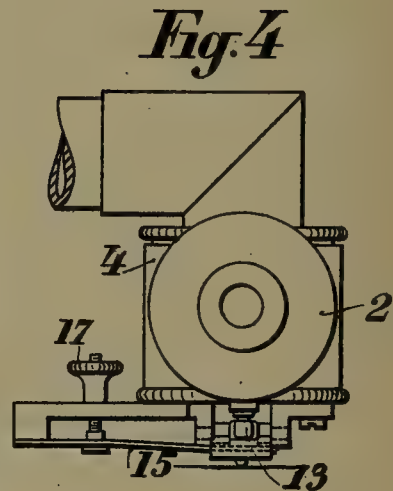
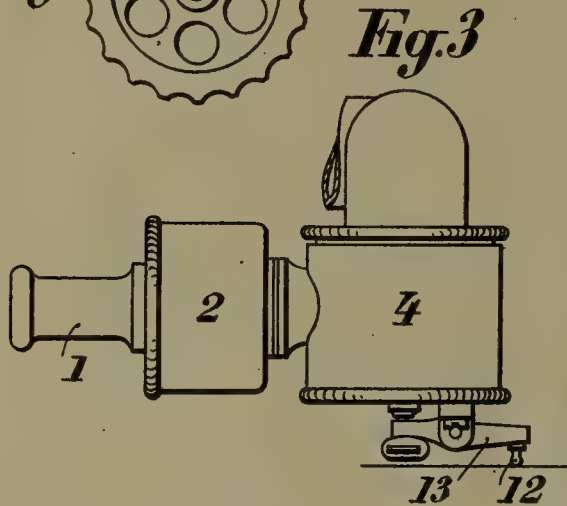
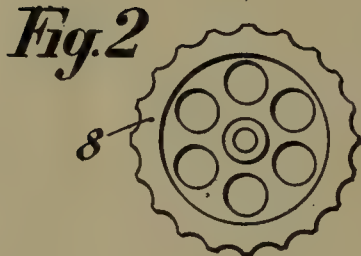
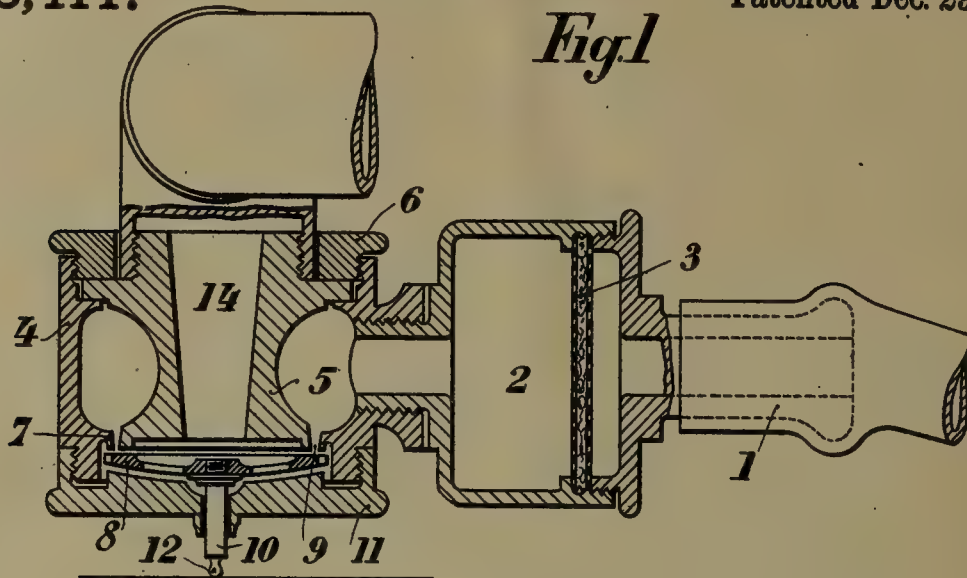
NORMAN S. WAITE,
ANNIE B. HENSTIS.

H. JOLY.
COMPRESSED AIR TALKING MACHINE FOR PHONOGRAPHS, GRAMOPHONES, AND OTHER
SPEAKING MACHINES.

APPLICATION FILED DEC. 4, 1906.

908,411.

Patented Dec. 29, 1908.



WITNESSES
John H. Tucker
Richard H. Tucker

INVENTOR
H. Joly
By Geo. A. Whittaker

UNITED STATES PATENT OFFICE.

HENRY JOLY, OF PARIS, FRANCE, ASSIGNOR TO COMPAGNIE GENERALE DE PHONOGRAPHES, CINEMATOGRAPHERS ET APPAREILS DE PRECISION, OF PARIS, FRANCE.

COMPRESSED-AIR TALKING-MACHINE FOR PHONOGRAPHS, GRAMOPHONES, AND OTHER SPEAKING-MACHINES.

No. 908,411.

Specification of Letters Patent.

Patented Dec. 29, 1908.

Application filed December 4, 1906. Serial No. 346,242.

To all whom it may concern:

Be it known that I, HENRY JOLY, citizen of the French Republic, residing at Paris, in the Department of the Seine, France, have
5 invented certain new and useful Improvements in a Compressed-Air Talking-Machine for Phonographs, Gramophones, and other Speaking-Machines, of which the following is a specification.

10 It is known that it is possible to make use of the escape of compressed air to enunciate a phonographic record.

In enabling the above mentioned theorem to be put into practice, and forming the object of the present invention, there is employed a valve having a relatively small surface and of light enough weight for it to be arranged in the passage of a compressed
15 air conductor and which follows exactly the undulations of the phonogram. These parts have as their object to render undulatory the current of air which they allow to pass.

On the drawings attached to the present description, and which are given as examples, Figure 1 is a vertical section on an enlarged scale of a form of carrying out the invention with a valve, applied to a phonographic disk or cylinder. Fig. 2 is a plan
25 of the valve of the above mentioned apparatus. Figs. 3 and 4 are respectively front and side views of another form of carrying out the invention applied as in Fig. 1. Figs. 5 and 6 are front and side views of the arrangement, Figs. 3 and 4, applied to a disk
30 or plate.

The compressed air provided from any reservoir passes through a flexible tube to the mouthpiece 1 and flows into a small box 2, situated in front of the enunciator proper,
35 and which has for its object to form an air reserve (a fly wheel as one might say). At the entrance to this box is arranged a partition 3 formed of two fine wire gage disks having cotton between them, which serves to filter the air passing to the enunciator.

From the box 2 the air passes into a second box 4, forming the case of the enunciator proper. In this box 4 is arranged a core 5 around which the air circulates freely
40 and which is hermetically attached to one end of the said box, by means of a screwed ring 6. The part of the core 5 opposite to the ring 6 only leaves between its edge and the interior surface of the box 4 a very small

annular space 9, through which the compressed air can escape. This same part of the core 5 is exactly level with the corresponding part of the box 4 forming the turned over edge 7, so that these parts are both situated in the same plane. Against
55 the seat thus formed on each side of the space 9 rests the flat annular surface of a valve 8 made of some light material such as, for example, aluminium. This valve is guided in its movements by a pin 10 which it carries in its center and which passes through the center of a cover 11 closing the box 4 on this side. The air coming into this part of the box 4 can only pass through a channel 14 made in the center of the core 5, and it
60 then goes directly to the trumpet of the instrument.

According to the manner in which the above arrangement is applied, the valve 8 may either carry directly on the outside extremity of the pin 10 the style 12 which follows the ridge of the record, or it may receive its impulse from an intermediate lever 13 which itself carries the style, as shown in the methods of carrying out the
65 arrangement, Figs. 3, 4 and 5, 6.

The action is as follows: When the phonograph is working the mass of the enunciator being comparatively great, the entire enunciator cannot follow the vibrations inscribed on the disk, but it is not the same with the valve 8, the weight of which is very small and which actuated by the pressure of the air, bears continually with its pin 10 on the phonographic record, thus
70 forming between it and its seat a passage having a section proportional to the phonographic variations. It is in this space which is always varying, that the compressed air escapes. There is thus a reproduction of the sounds by the jet of compressed air which escapes through the ordinary trumpet of the phonograph. The holes in the valve 8 have for their object to avoid the effects of resistances which the pressure on all the surface of the valve during the escape would produce; the air expanding quickly on the two faces of this valve equalizes the pressure on the two sides.

Figs. 1, 3 and 4 show the arrangement applied to a disk phonograph; in the method of attachment, Fig. 1, the style is carried directly by the valve 8, while in the ar-
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105

rangement 3 and 4 it is carried by the intermediate lever 13. It is evident that the same system may be applied to cylinder phonographs or disk phonographs and also
5 to the machines called gramophones. In the latter case, as shown by the Figs. 5 and 6 the box 4 of the enunciator is arranged horizontally. The sinuosities registered on the disk are then transferred to the valve
10 by a lever 13. The extremity of this lever carries the needle 16 used in this class of machines. A spring 15 equalizes laterally the pressure of the air and the regulation of the tension of this spring is effected by
15 means of a screw 17.

Having thus described my invention, what I claim is:

20 1. In a talking machine, the combination with a casing having a receiving chamber provided with an annular seat, of a tubular core extending into said chamber and having a seat concentric with that on the casing, leaving an annular port between them,

a source of compressed air connected with said receiving chamber, a light valve seating against said seats on the casing and the core, and a style connected with said valve.

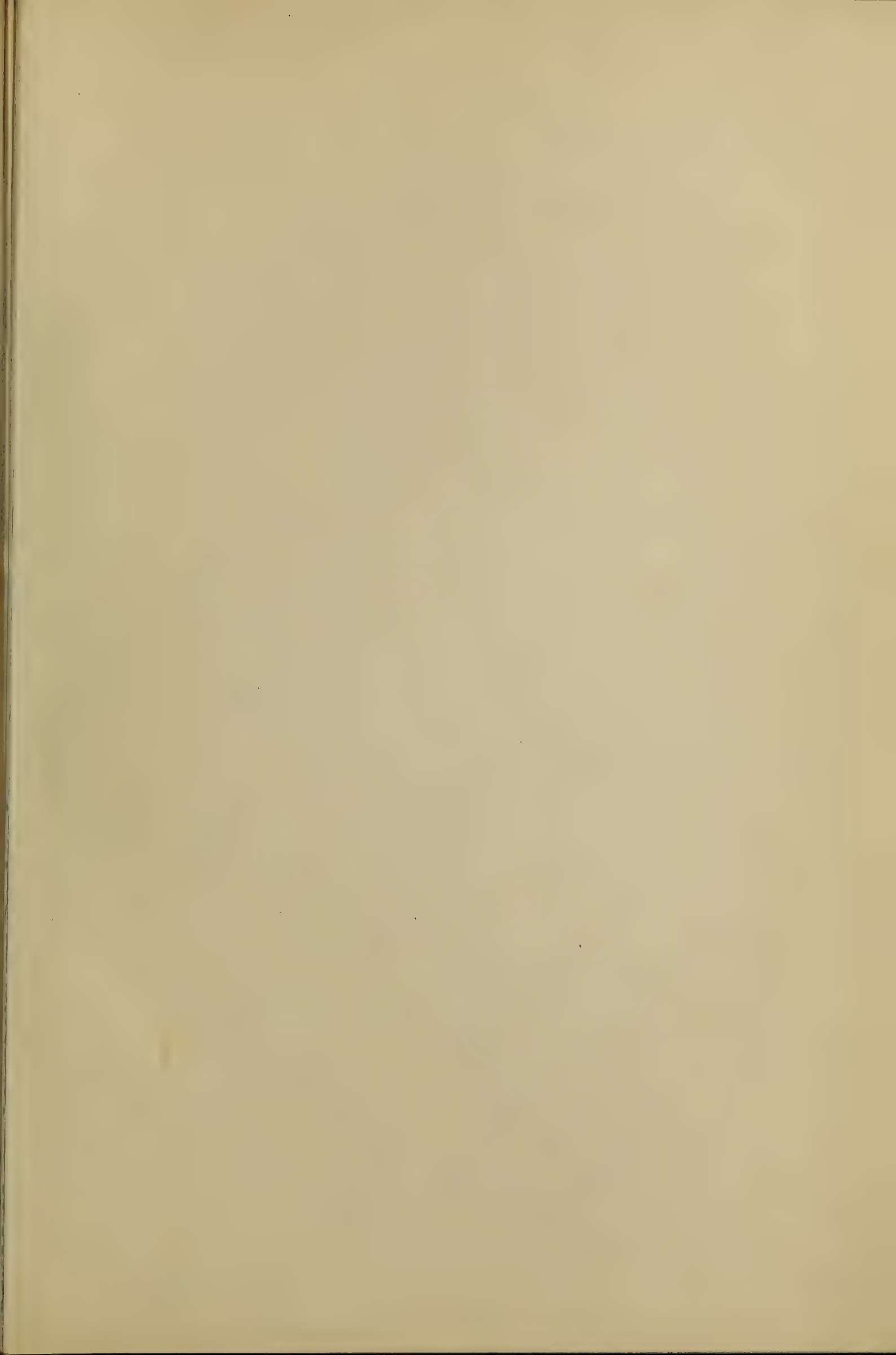
2. In a talking machine, the combination with a casing having an internal annular seat facing towards one end thereof, of a
30 compressed air pipe entering said casing in the rear of said seat, a tubular core entering the opposite end of said casing and provided with an annular seat concentric with the seat on the casing, leaving an annular port
35 between them, a light loose valve seating against said seats and exposed to the air pressure coming through said port, and a style connected with said valve.

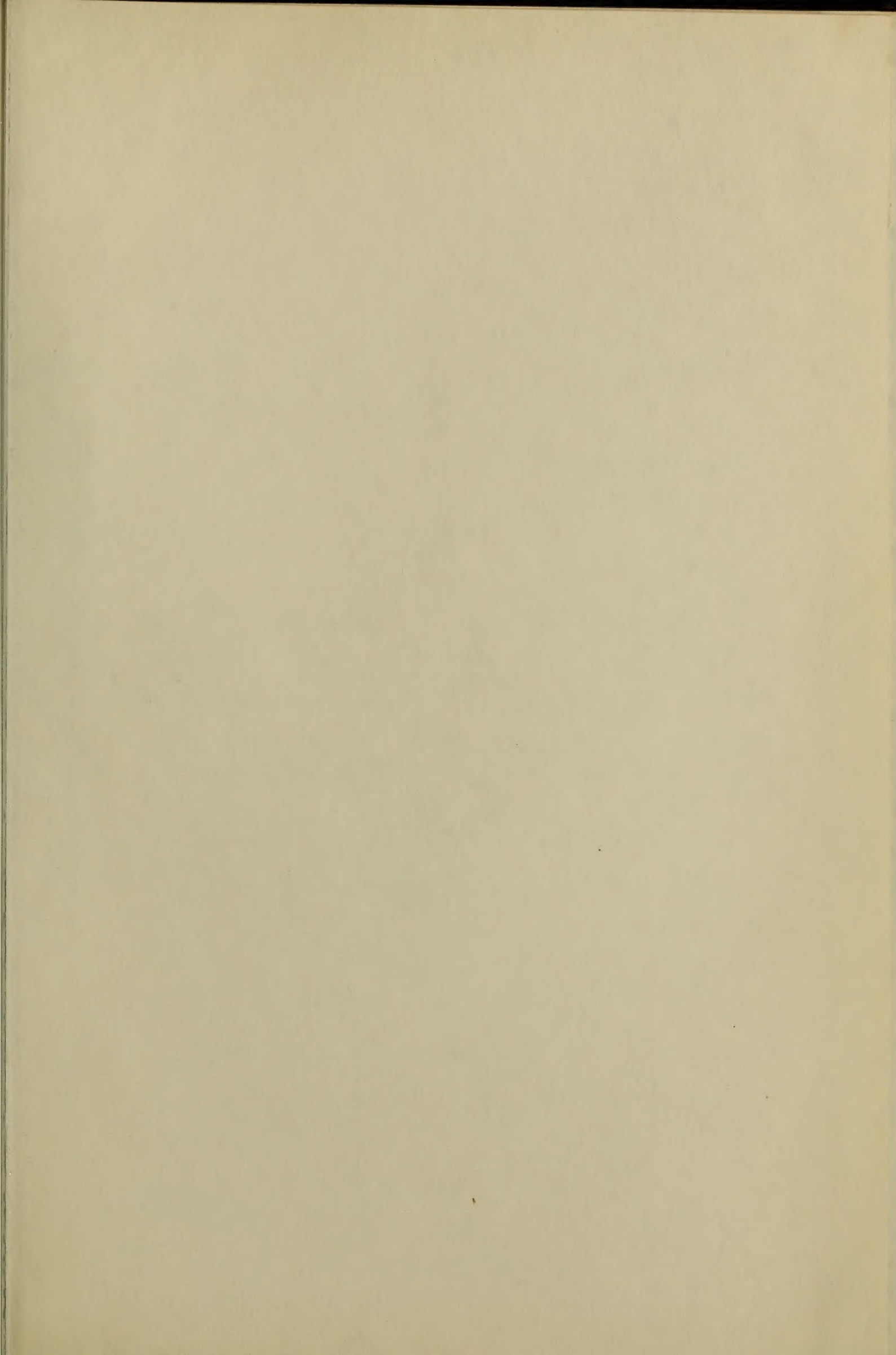
In testimony whereof I affix my signature
40 in presence of two witnesses.

HENRY JOLY.

Witnesses:

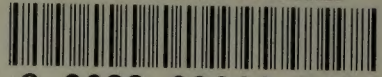
HENRY DANZER,
MARION CRESPIN.







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